Intel® Matrix Storage Manager

Intel® Matrix Storage Technology

User's Manual

Revision 2.6

January 2006

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Revision History

Revision Number	Description	Revision Date
1.0	Initial Release.	March 20, 2003
1.1	Added RAID 1 information	June 6, 2003
2.0	Added Intel® Matrix RAID Technology, AHCI/Native Command Queuing information	June 15, 2004
2.1	Updated screen captures	June 21, 2004
2.2	Updated ICH6R requirements and Option ROM updates	November 16, 2004
2.3	Updated Unattended Installation instructions to add AHCI instructions. Updated for ICH6M	December 7, 2004
2.4	Removed incorrect RAID 0 restore information Updated AHCI information throughout Added automatic F6 floppy instructions	January 10, 2005
2.5	Updated User's Manual to include Intel® Matrix Storage Manager 5.0 feature set	May, 2005
2.6	Replaced list of chipsets that support AHCI with link to web site	January, 2006

Document Conventions

Throughout this document, symbols are used to indicate important messages to the reader. These are marked as note, important note, caution or warning.

Note: Note and **Important Note**: Means *reader take note*. Notes can also contain helpful suggestions or references.

Caution: Caution: This symbol means *reader be careful.*

Warning: Warning: Not following these instructions might render the system unusable. Certain functions may also have consequences that you need to be aware of.

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1 Scope of This Document

This document discusses how to properly configure your system when using the Intel® Matrix Storage Manager.

The issues information in this guide is only relevant on systems implementing an AHCI or RAID solution and using a supported Intel chipset and supported operating system.

- Supported Intel chipsets
  http://support.intel.com/support/chipsets/imsm/sb/CS-020644.htm

- Supported operating system
  http://support.intel.com/support/chipsets/imsm/sb/CS-020648.htm

Please note that the Intel Matrix Storage Manager does NOT support Beta or pre-released versions of any Windows* operating systems.

The majority of the information in this document is related to either software configuration or hardware integration. Intel is not responsible for the software written by third party vendors or the implementation of Intel components in the products of third party manufacturers.

Customers should always contact the place of purchase or system/software manufacturer with support questions about their specific hardware or software configuration.

2 RAID Background

RAID (Redundant Array of Inexpensive Disks) was originally conceived at the University of California at Berkeley in 1987 by David A. Patterson, Garth Gibson, and Randy H. Katz. The focus of their research was to improve storage subsystem performance and reliability. As a result of their findings, they proposed five levels of RAID (RAID 0 – RAID 5) to provide a balance of performance and data protection. Each RAID level is designed for speed, data protection, or a combination of both. Patterson, Gibson, and Katz published their findings in a document titled "A Case for Redundant Arrays of Inexpensive Disks (RAID)." This document is archived at the University of California, Berkeley:

http://sunsite.berkeley.edu/TechRepPages/CSD-87-391

RAID was designed to improve the way computers manage and access large amounts of data by providing an independent and redundant system of disks. Instead of writing to one Single Large Expensive Disk (SLED), RAID writes to multiple independent disks.

3 RAID 0 (Striping)

RAID 0 uses the read/write capabilities of two or more hard drives working in unison to maximize the storage performance of a computer system. Data in a RAID 0 array is arranged into blocks that are interleaved among the disks so that reads and writes can be performed in parallel (see below diagram). This technique, known as “striping”, is the fastest of all of the RAID levels, especially for reading and writing large sequential files. Real world tasks where RAID 0 can be of particular benefit include loading large files into image editing applications, saving large movie files in a video editing application, or creating CD or DVD images with a CD/DVD authoring package.

The hard drives in a RAID 0 array are combined to form one volume which appears as a single virtual drive to the operating system. For example, two 400 GB hard drives in a RAID 0 array will appear as a single 800 GB hard drive to the operating system.

No redundancy information is stored in a RAID 0 array. This means that if one hard drive fails, all data on both drives is lost. This lack of redundancy is also reflected by the RAID level 0, which indicates no redundancy. RAID 0 is not recommended for use in servers or other environments where data redundancy is a primary goal.

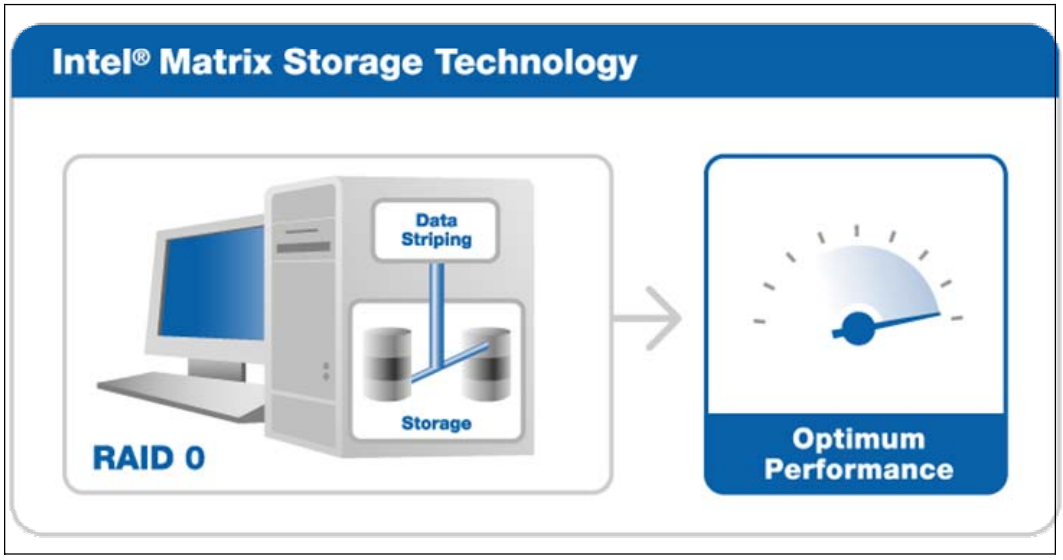


Figure 1. RAID 0

Minimum Disks:	2
Advantage:	Highest transfer rates
Fault-tolerance:	None – if one disk fails all data will be lost
Application:	Typically used in desktops and workstations for maximum performance for temporary data and high I/O rate. Not available in mobile configurations.

4 RAID 1 (Mirroring)

A RAID 1 array contains two hard drives where the data between the two is mirrored in real time. Because all of the data is duplicated, the operating system treats the usable space of a RAID 1 array as the maximum size of one hard drive in the array. For example, two 400 GB hard drives in a RAID 1 array will appear as a single 400 GB hard drive to the operating system.

The primary benefit of RAID 1 mirroring is that it provides good data reliability in the case of a single disk failure. When one disk drive fails, all data is immediately available on the other without any impact to the data integrity. In the case of a disk failure, the computer system will remain fully operational to ensure maximum productivity.

The performance of a RAID 1 array is greater than that of a single drive because data can be read from multiple disks – the original and the mirror – simultaneously. Disk writes do not realize the same benefit because data must first be written to one drive, then mirrored to the other.

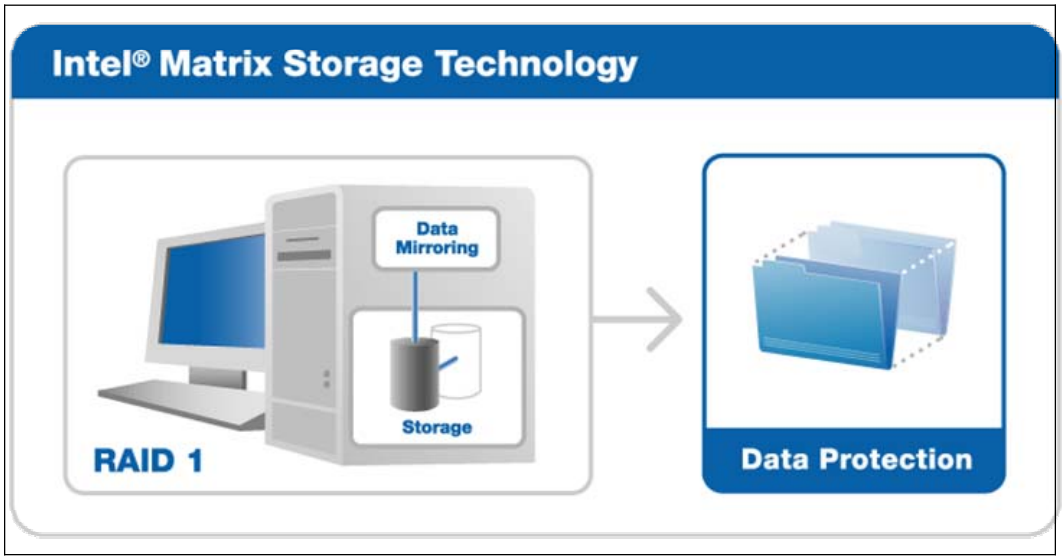


Figure 2. RAID 1

Minimum Disks:	2
Advantage:	100% redundancy of data. One disk may fail, but data will continue to be accessible. A rebuild to a new disk is recommended to maintain data redundancy.
Fault-tolerance:	Excellent – disk mirroring means that all data on one disk is duplicated on another disk.
Application:	Typically used for smaller systems where capacity of one disk is sufficient and for any application(s) requiring very high availability. Not available in mobile configurations.

5 RAID 5 (Striping with Parity)

A RAID 5 array contains three or more hard drives where the data is divided into manageable blocks called strips. Parity is a mathematical method for recreating data that was lost from a single drive, which increases fault-tolerance. The data and parity are striped across all the hard drives in the array. The parity is striped in a rotating sequence to reduce bottlenecks associated with the parity calculations.

The capacity of a RAID 5 array is the size of the smallest drive multiplied by one less than the number of drives in the array. The equivalent of only a single hard drive is used to store the parity information, allowing for fault-tolerance with less than the 50% capacity reduction of RAID 1. For example, three 400 GB hard drives in a RAID 5 array will appear as a single 800 GB hard drive to the operating system.

The primary benefits of RAID 5 include capacity and data protection. Because parity is used for data protection, up to 75% of the total drive capacity is usable. Further, any single drive can fail and it is possible to rebuild the data after replacing the failed hard drive with a new drive. However, the extra work of calculating the missing data will degrade the write performance to the RAID 5 volume while the volume is being rebuilt.

The read performance of a RAID 5 array is greater than that of a single drive because data can be read from multiple disks simultaneously. Disk writes do not realize the same benefit because parity must be calculated and written to all the drives.

To enhance the write performance of RAID 5, Intel® Matrix Storage Manager software has implemented a RAID 5 volume write-back cache and coalescer.

The volume write-back cache allows writes to be buffered and improves coalescing. The cache is disabled by default, but can be enabled by the user through the Intel® Matrix Storage Console. An Uninterrupted Power Supply (UPS) is recommended for use if the cache is enabled.

The coalescer allows write requests to be combined into larger requests to reduce the number of I/Os per write for parity calculations. The coalescer is enabled by default, and the user does not have the option to disable it.

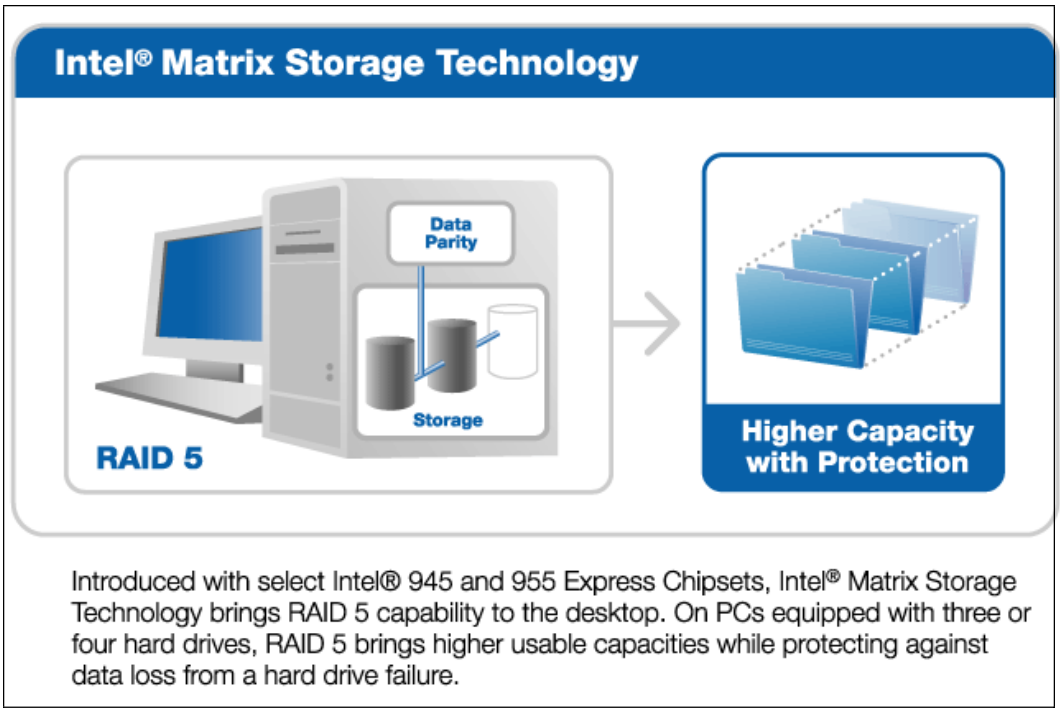

Intel® Matrix Storage Technology
Data
Parity
Storage
RAID 5
Higher Capacity
with Protection
Introduced with select Intel® 945 and 955 Express Chipsets, Intel® Matrix Storage Technology brings RAID 5 capability to the desktop. On PCs equipped with three or four hard drives, RAID 5 brings higher usable capacities while protecting against data loss from a hard drive failure.

Figure 3. RAID 5

Minimum Disks:	3
Advantage:	Higher percentage of usable capacity and high read performance as well as fault-tolerance.
Fault-tolerance:	Excellent - parity information allows data to be rebuilt after replacing a failed hard drive with a new drive.
Application:	Storage of large amounts of critical data. Not available in mobile configurations.

6 RAID 10 (RAID 0+1)

A RAID 10 array uses four hard drives to create a combination of RAID levels 0 and 1. The data is striped across a two-drive array forming the RAID 0 component. Each of the drives in the RAID 0 array is then mirrored by a RAID 1 component.

Since all of the data on the RAID 0 array is duplicated, the capacity of a RAID 10 array is the size of the RAID 0 array. For example, four 400 GB hard drives in a RAID 10 array will appear as a single 800 GB hard drive to the operating system.

The primary benefit of RAID 10 is that it combines the benefits of RAID 0 performance and RAID 1 fault-tolerance. It provides good data reliability in the case of a single drive failure. When one hard drive fails, all data is immediately available from the other half of the mirror without any impact to the data integrity. In the case of a disk failure, the computer system will remain fully operational to ensure maximum productivity. Data fault-tolerance can be restored by replacing the failed drive.

The performance of a RAID 10 array is greater than that of a single drive since data can be read from multiple disks simultaneously. Compared to a two-disk RAID 0, RAID 10 read performance is higher as data can be read from either half of the mirror, but write performance is slightly lower due to ensuring data is written out completely to the array.

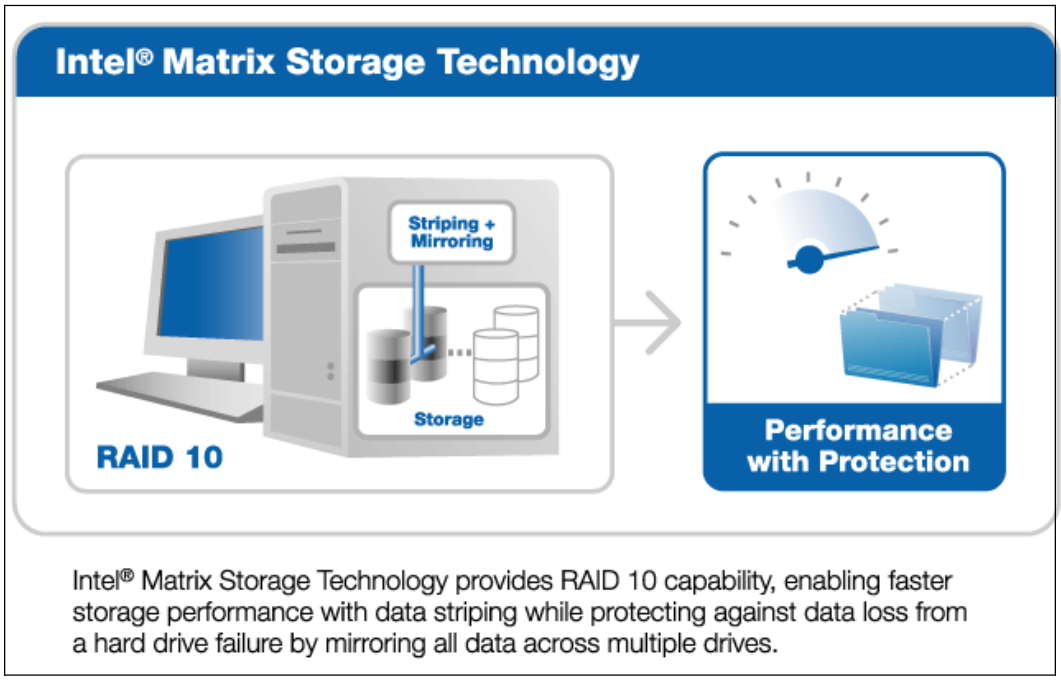

Intel® Matrix Storage Technology
Striping + Mirroring
Storage
RAID 10
Performance with Protection
Intel® Matrix Storage Technology provides RAID 10 capability, enabling faster storage performance with data striping while protecting against data loss from a hard drive failure by mirroring all data across multiple drives.

Figure 4. RAID 10

Minimum Disks:	4
Advantage:	Combines the read performance of RAID 0 with the fault-tolerance of RAID 1.
Fault-tolerance:	Excellent – disk mirroring means that all data on one disk is duplicated on another disk.
Application:	High-performance applications requiring data protection, such as video editing. Not available in mobile configurations.

7 Matrix RAID (Two Volumes Per Array)

Matrix RAID allows you to create two RAID volumes, of the same or different types, on a single RAID array.

On systems with an Intel® 82801GR or Intel® 82801GH controller hub, Intel® Matrix Storage Manager allows you to create a matrix RAID configuration with three or four hard drives that utilizes RAID 0, RAID 5, or RAID 10, as well as continuing to provide the benefits of RAID 0 performance and RAID 1 protection on two hard drives.

A matrix RAID configuration with RAID 0 and RAID 5 on four hard drives provides better data protection than RAID 0, by providing one volume of RAID 5 storage where data can be protected from a single hard drive failure. Also, matrix RAID can provide greater total storage capacity and improved performance than RAID 5 alone.

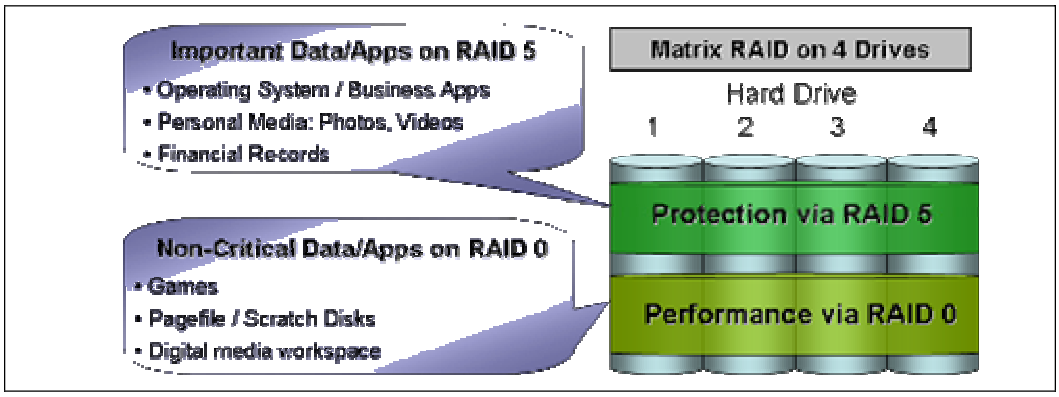


Figure 5. Matrix RAID

8 RAID Migration Feature

The RAID migration feature in the Intel® Matrix Storage Manager is an advanced software technology that enables a properly configured PC, known as a “RAID Ready” system, to be converted into a high-performance RAID 0, RAID 1, RAID 5, or RAID 10 configuration by adding one or more Serial ATA hard drives to the system and invoking the RAID migration process from within Windows*.

The RAID migration feature also allows the user to migrate data from a RAID 0, RAID 1, or RAID 10 volume to RAID 5 by adding any additional Serial ATA hard drives necessary and invoking the modify volume process from within Windows.

The following migrations are supported by Intel Matrix Storage Manager:

- "RAID Ready" to 2, 3, or 4-drive RAID 0
- "RAID Ready" to 2-drive RAID 1
- "RAID Ready" to 3 or 4-drive RAID 5
- "RAID Ready" to 4-drive RAID 10
- 2-drive RAID 0 to 3 or 4-drive RAID 5
- 3-drive RAID 0 to 4-drive RAID 5
- 2-drive RAID 1 to 3 or 4-drive RAID 5
- 4-drive RAID 10 to 4-drive RAID 5

The migrations do not require re-installing the operating system. All applications and data remain intact.

The migration process can take as long as several hours, depending on the size of the hard drives being converted, but the system is still fully functional while the migration is being performed – it is possible to conduct other activities such as use the Internet or run work-related applications while the system is being migrated. The only limitation is that some disk-intensive tasks may have slower performance during a RAID migration.

The RAID migration feature also features advanced safety algorithms to ensure that an interrupted migration does not result in data loss or corruption. If the migration process is interrupted by a power loss or system reset, the migration will resume from the point of its most recent progress upon the next system reboot.

9 Serial ATA (SATA)

9.1 Description

Serial ATA (SATA) is a storage interface designed to replace parallel ATA (e.g. IDE technology). SATA was designed for a variety of reasons including performance headroom, cabling issues, and voltage tolerance requirements. SATA combines software and operating system transparency, low cost, scalability, and design flexibility. One of the main design advantages of SATA is that the cables are thinner than ATA cables, which not only improves air flow inside the case but also allows smaller case designs. Another design advantage is that the SATA cables can be up to 1m long, compared to the 45cm of the older PATA cables, which allows more flexibility in hard drive placement within the case. The signal voltage is much lower as well: 250 mV for SATA versus 5 V for PATA. SATA has attracted widespread industry support through the Serial ATA Working Group (www.sata-io.org).

Note: Please refer to Appendix A for additional information on Serial ATA hard drives.

9.2 Installing Serial ATA Hard Drives

Note: Please refer to Appendix A for additional information on Serial ATA hard drives.

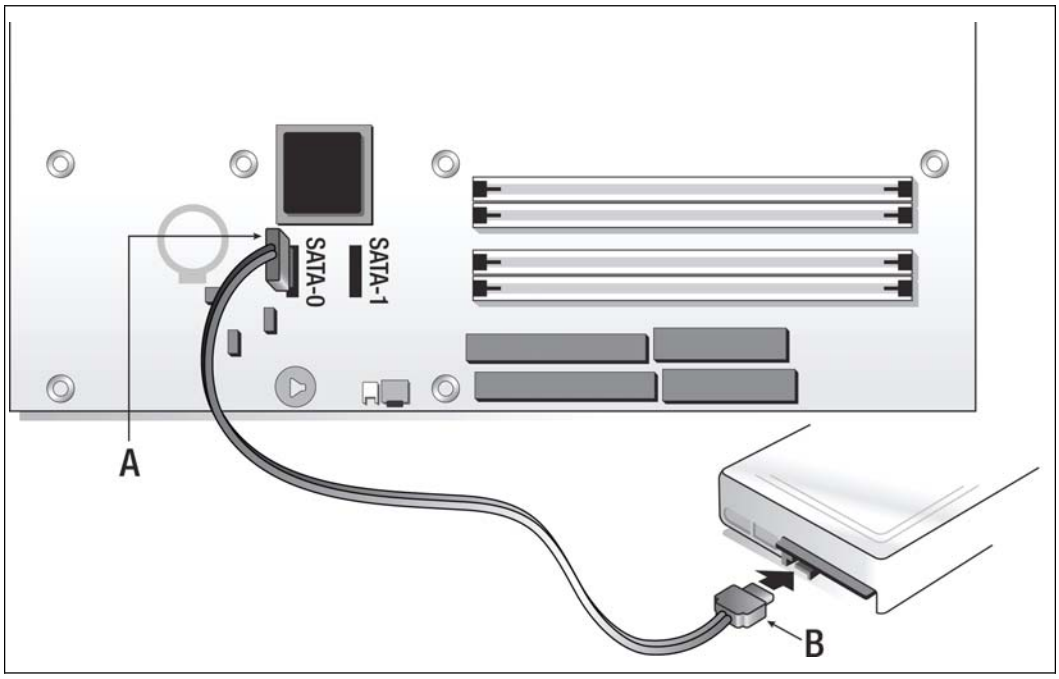
Installing Serial ATA (SATA) hard drives requires a SATA data cable (7-pin, 4-conductor) which supports the Serial ATA protocol and a SATA power cable. Either end of the SATA data cable can be connected to the SATA hard drive or the connector on the motherboard.

For correct cable installation** (refer to illustration below):

1. Attach either cable end to the connector (A) on the motherboard
2. Attach the other cable end (B) to the SATA hard drive

Note: Both the data and power SATA cables are new designs – you cannot use older 40-pin 80-conductor IDE or regular IDE power cables with SATA hard drives.

** You should always carefully follow any instructions that come from the hard drive manufacturer



10 Advanced Host Controller Interface / Native Command Queuing

Advanced Host Controller Interface

Advanced Host Controller Interface (AHCI) is an interface specification that allows the storage driver to enable advanced Serial ATA features such as Native Command Queuing and Native Hot Plug.

- Intel chipsets that support AHCI
  http://support.intel.com/support/chipsets/imst/sb/CS-012304.htm

AHCI also requires Intel® Application Accelerator version 4.x or Intel® Matrix Storage Manager.

Native Command Queuing

Native Command Queuing (NCQ) is a feature supported by AHCI that allows Serial ATA hard drives to accept more than one command at a time. NCQ, when used in conjunction with one or more hard drives that support NCQ, increases storage performance on random workloads by allowing the drive to internally optimize the order of commands.

Note: To take advantage of NCQ, you need the following:

- A chipset that supports AHCI
- Intel Application Accelerator version 4.x or Intel Matrix Storage Manager
- One or more Serial ATA hard drives which support NCQ

Native Hot Plug

Native hot plug is a feature supported by AHCI that allows Serial ATA hard drive removal or insertion while the system is powered on and running. For example, this feature may be used when replacing a failed hard drive that is in an externally-accessible drive enclosure.

Note: To take advantage of native hot plug, you need the following:

- A chipset that supports AHCI
- Intel Application Accelerator version 4.x or Intel Matrix Storage Manager
- One or more Serial ATA hard drives which support hot plug

11 Intel® Matrix Storage Manager

11.1 Description

The Intel Matrix Storage Manager software package provides high-performance Serial ATA and Serial ATA RAID capabilities in Windows* XP, Windows 2000, Windows Server 2003, Windows XP x64 Edition, and Windows Server 2003 x64 Edition. It was previously known by the names “Intel® Application Accelerator RAID Edition” and “Intel Application Accelerator 4.x”. Intel Matrix Storage Manager contains the following key features:

- Serial ATA RAID driver providing high performance RAID 0, fault-tolerant RAID 1, high capacity & fault-tolerant RAID 5, high performance & fault-tolerant RAID 10, and matrix RAID for the benefits of two RAID volumes on a single array.
- Advanced Host Controller Interface support for RAID and non-RAID Serial ATA drives, providing Native Command Queuing performance benefits, as well as Native Hot Plug capability.
- Intel® Matrix Storage Console, which provides the Windows* user interface for managing Serial ATA drives, offering increased usability in managing RAID arrays.
- Migration Feature, allowing migration from a single-drive (also known as “RAID Ready”) configuration to a RAID 0, RAID 1, RAID 5, RAID 10, or matrix RAID configuration. The ability to migrate from a RAID 0, RAID 1, or RAID 10 configuration to RAID 5 is also available. The migrations do not require a reinstallation of the operating system.
- 3 and 4-drive RAID 0 support, allowing the user to continue to scale the performance benefits of RAID 0.

11.2 Do You Need the Intel Matrix Storage Manager?

Use the Intel Matrix Storage Manager if you have supported hardware and would like to enable AHCI features and RAID performance or data protection features on two or more hard drives, or would like to use AHCI features on single-drive RAID (“RAID Ready”) systems. The Intel Matrix Storage Manager is not required for stand-alone Serial ATA hard drive(s) to work properly (e.g. not configured for RAID or AHCI).

To use the Intel Matrix Storage Manager, your system must meet ALL of the following requirements:

- A supported Intel chipset
  http://support.intel.com/support/chipsets/imsm/sb/CS-020644.htm
- A supported operating system
  http://support.intel.com/support/chipsets/imsm/sb/CS-020648.htm

To take advantage of increased storage subsystem performance and overall system performance, your system must meet the following requirements:

- A Serial ATA capable hard drive

Warning: Serial ATA has specific requirements. Please refer to the Appendix C.3 for more information.

12 Configuring BIOS for Intel Matrix Storage Technology for Serial ATA on Intel Motherboards

12.1 BIOS Importance

To install the Intel® Matrix Storage Manager, the system BIOS must include the Intel Matrix Storage Manager option ROM. ICH7R-based systems should use option ROM version 5.0. ICH6R-based systems should use option ROM version 4.x. ICH5R-based systems should use option ROM version 3.x. An option ROM is not necessary on mobile systems.

The system BIOS must be set up correctly for the RAID controller before you install the Intel Matrix Storage Manager. Refer to the motherboard documentation or contact the motherboard manufacturer or your place of purchase for instructions on configuring the system BIOS for RAID.

If you are using an Intel motherboard with a supported Intel chipset (*see* http://support.intel.com/support/chipsets/imsm/sb/CS-020644.htm), Section 12.2 identifies how to configure the BIOS for Intel® Matrix Storage Technology for Serial ATA.

12.2 BIOS Settings

Note: The instructions listed below are specific to motherboards manufactured by Intel with a supported Intel chipset. Always follow the instructions that are provided with your motherboard.

** The specific BIOS settings on non-Intel manufactured motherboards may differ from the instructions listed below. **

The RAID option must be enabled in BIOS before the system can load the Intel Matrix Storage Manager option ROM code for Intel Matrix Storage Technology.

1. Enter the BIOS Setup program by pressing the <F2> key after the Power-On-Self-Test (POST) memory test begins.
2. Select the Advanced menu, then the Drive Configuration menu.
3. Switch the Drive Mode option from Legacy to Enhanced.
4. Enable Intel(R) RAID Technology.
5. Press <F10> to save the BIOS settings and exit the BIOS Setup program.

13 Intel Matrix Storage Manager Option ROM

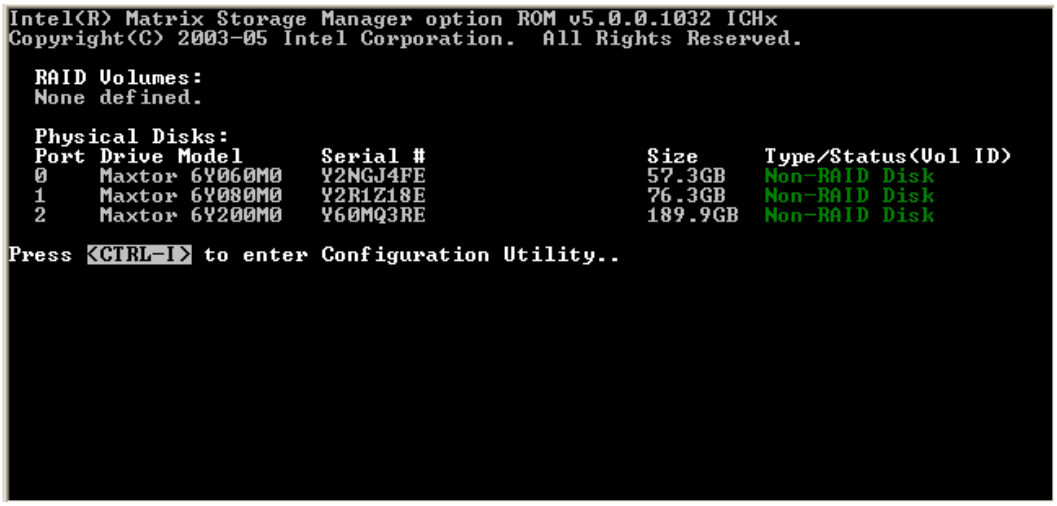
The Intel Matrix Storage Manager option ROM should be integrated with the system BIOS on all motherboards that use a supported Intel chipset (*see* http://support.intel.com/support/chipsets/imsm/sb/CS-020644.htm). The Intel Matrix Storage Manager option ROM is a PnP option ROM that provides a pre-operating system user interface for the Intel RAID implementation and provides BIOS and DOS disk services (Int13h).

13.1 Entering Option ROM User Interface

Serial ATA RAID volumes may be configured using the user interface within the RAID option ROM.

During the Power-On Self Test (POST), the following message will appear for a few seconds:

Note: The 'Drive Model', 'Serial #', and 'Size' listed in your system can differ from the following example.


Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
RAID Volumes:
None defined.
Physical Disks:
Port Drive Model Serial # Size Type/Status(Vol ID)
0 Maxtor 6Y060M0 Y2NGJ4FE 57.3GB Non-RAID Disk
1 Maxtor 6Y080M0 Y2R1Z18E 76.3GB Non-RAID Disk
2 Maxtor 6Y200M0 Y60MQ3RE 189.9GB Non-RAID Disk
Press <CTRL-I> to enter Configuration Utility..

After the above message appears, press the <Ctrl> and <i> keys simultaneously to enter the RAID Configuration Utility.

13.2 Confirming Version of Intel Matrix Storage Manager Option ROM Installed

There is only one way to determine which version of the Intel Matrix Storage Manager option ROM has been integrated into the system BIOS:

- Press the CTRL + I keys when you see the 'Intel(R) Matrix Storage Manager RAID Option ROM' status screen appear (should appear early in system boot-up, during the Power-On Self Test (POST))
- Located in the top right corner you should see a version number in the following format: V5.0.0.xxxx

13.3 Creating, Deleting, and Resetting RAID Volumes

13.3.1 How To Create a RAID Volume

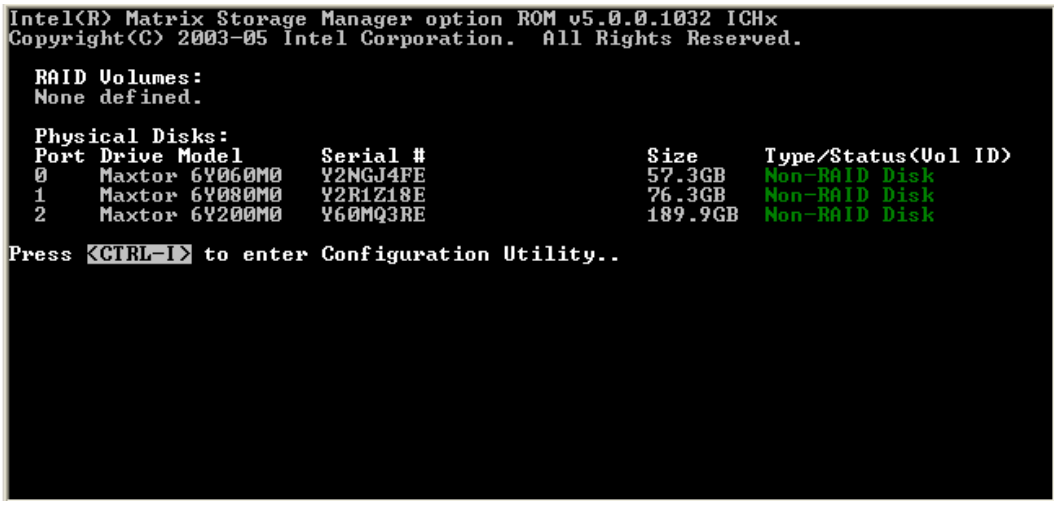
1. Select option *1 Create RAID Volume* and press the `<Enter>` key.
2. Type in a volume name and press the <Enter> key, or simply press the <Enter> key to accept the default name.
3. Select the RAID level by scrolling through the available values (RAID 0, RAID 1, RAID 5, RAID 10) by using the <↑> or <↓> keys.
4. Press the <Enter> key after you have selected the desired RAID level.
5. Unless you have selected RAID 1, select the strip value for the RAID array by scrolling through the available values by using the <↑> or <↓> keys and pressing the <Enter> key. The available values range from 4 KB to 128 KB in power of 2 increments. The strip value should be chosen based on the planned drive usage. The default selection is 128 KB for RAID 0 and RAID 10 volumes, and 64KB for RAID 5 volumes.
6. Press <Enter> to select the physical disks. This will bring up another dialog.
7. Select the appropriate number of hard drives by scrolling through the list of available hard drives by using the <↑> or <↓> keys and pressing the <Space> key to select the drive. When you have finished selecting hard drives, press the <Enter> key.
8. Select the volume size.
9. At the Create Volume prompt, press the <Enter> key to create the volume. Confirm this selection by pressing the <Y> key after the prompt.
10. Scroll to option 4 Exit and press the <Enter> key to exit the RAID Configuration utility. Confirm the exit by pressing the <Y> key.

Note: To change any of the information before the volume creation has been confirmed, you must exit the Create Volume process and restart it. Press the <Esc> key to exit the Create Volume process.

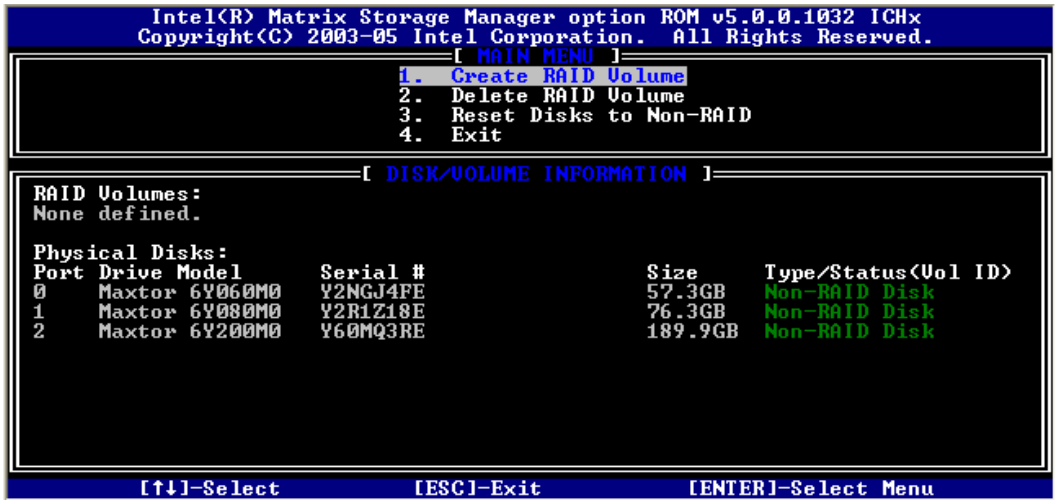
13.3.2 Example of RAID Volume Creation

Note: The following procedure should only be used with a newly-built system or if you are reinstalling your operating system. The following procedure should not be used to migrate an existing system to RAID 0. If you wish to create matrix RAID volumes after the operating system software is loaded, they should be created using the Intel Matrix Storage Console in Windows.

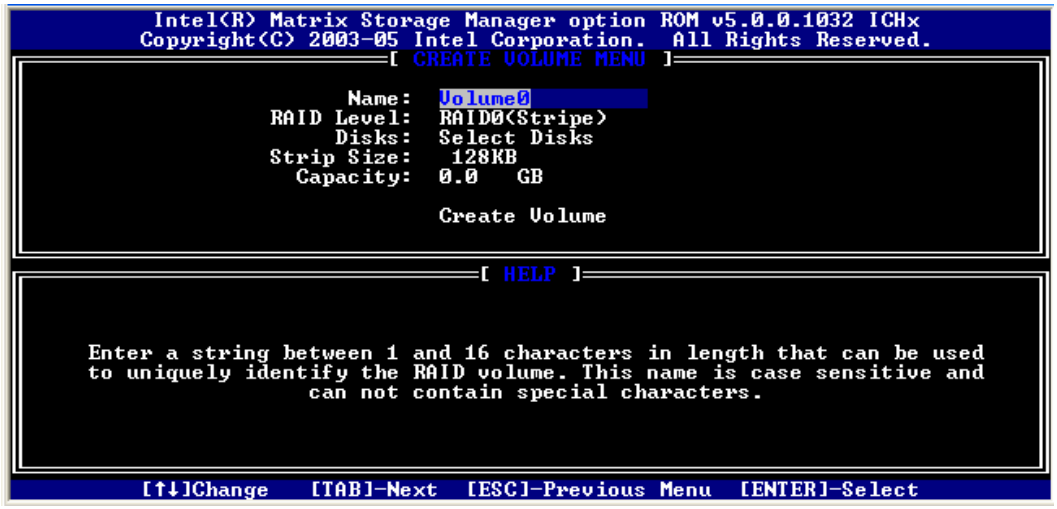
During the Power-On Self Test (POST), the following message will appear for a few seconds.


Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
RAID Volumes:
None defined.
Physical Disks:
Port Drive Model Serial # Size Type/Status(Vol ID)
0 Maxtor 6Y060M0 Y2NGJ4FE 57.3GB Non-RAID Disk
1 Maxtor 6Y080M0 Y2R1Z18E 76.3GB Non-RAID Disk
2 Maxtor 6Y200M0 Y60MQ3RE 189.9GB Non-RAID Disk
Press <CTRL-I> to enter Configuration Utility..

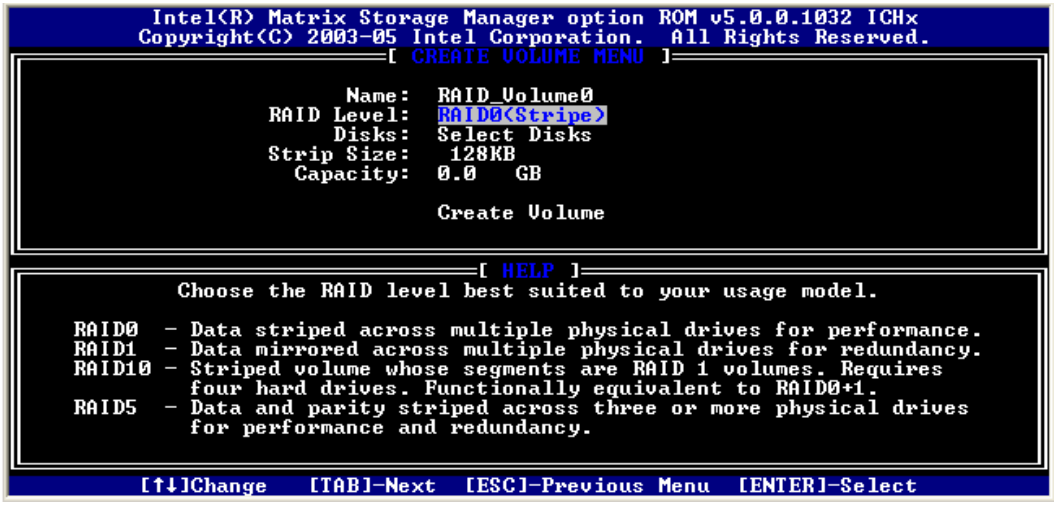
1. Press the <Ctrl> and <i> keys simultaneously, and the following window will appear:


Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[MAIN MENU]
1. Create RAID Volume
2. Delete RAID Volume
3. Reset Disks to Non-RAID
4. Exit
[DISK/VOLUME INFORMATION]
RAID Volumes:
None defined.
Physical Disks:
Port Drive Model Serial # Size Type/Status(Vol ID)
0 Maxtor 6Y060M0 Y2NGJ4FE 57.3GB Non-RAID Disk
1 Maxtor 6Y080M0 Y2R1Z18E 76.3GB Non-RAID Disk
2 Maxtor 6Y200M0 Y60MQ3RE 189.9GB Non-RAID Disk
[↑↓]-Select [ESC]-Exit [ENTER]-Select Menu

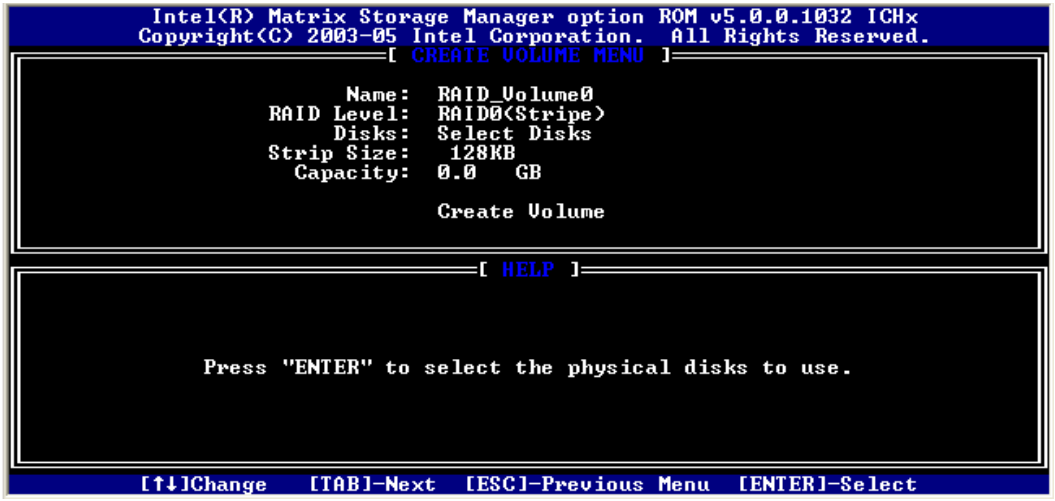
2. Select option 1 ‘Create RAID Volume’ and press the <Enter> key and the following window will appear:


Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[CREATE VOLUME MENU]
Name: Volume0
RAID Level: RAID0(Stripe)
Disks: Select Disks
Strip Size: 128KB
Capacity: 0.0 GB
Create Volume
[HELP]
Enter a string between 1 and 16 characters in length that can be used to uniquely identify the RAID volume. This name is case sensitive and can not contain special characters.
[↑↓]Change [TAB]-Next [ESC]-Previous Menu [ENTER]-Select

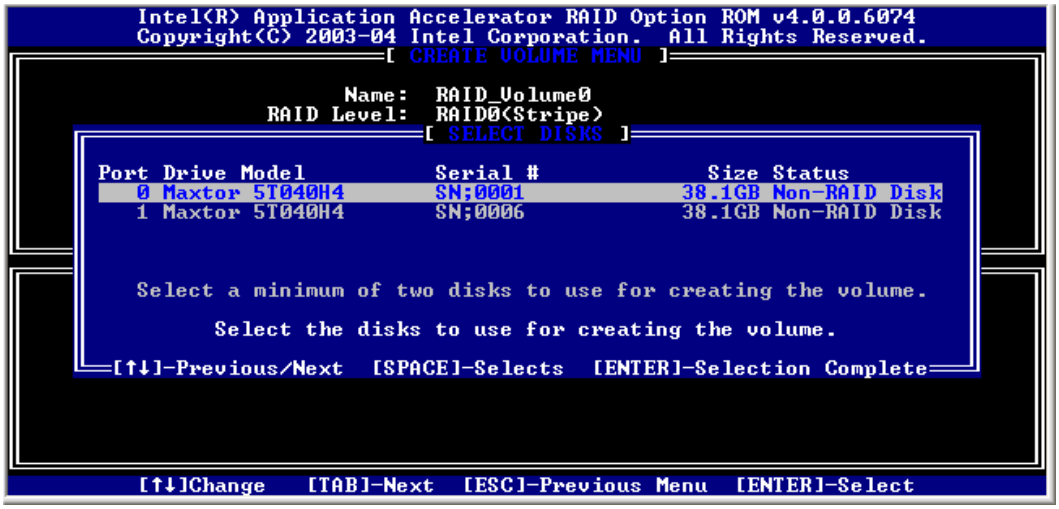
3. Specify a RAID volume name and then press the <TAB> or <ENTER> key to advance to the next field:


Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[CREATE VOLUME MENU]
Name: RAID_Volume0
RAID Level: RAID0(Stripe)
Disks: Select Disks
Strip Size: 128KB
Capacity: 0.0 GB
Create Volume
[HELP]
Choose the RAID level best suited to your usage model.
RAID0 - Data striped across multiple physical drives for performance.
RAID1 - Data mirrored across multiple physical drives for redundancy.
RAID10 - Striped volume whose segments are RAID 1 volumes. Requires four hard drives. Functionally equivalent to RAID0+1.
RAID5 - Data and parity striped across three or more physical drives for performance and redundancy.
[↑↓]Change [TAB]-Next [ESC]-Previous Menu [ENTER]-Select

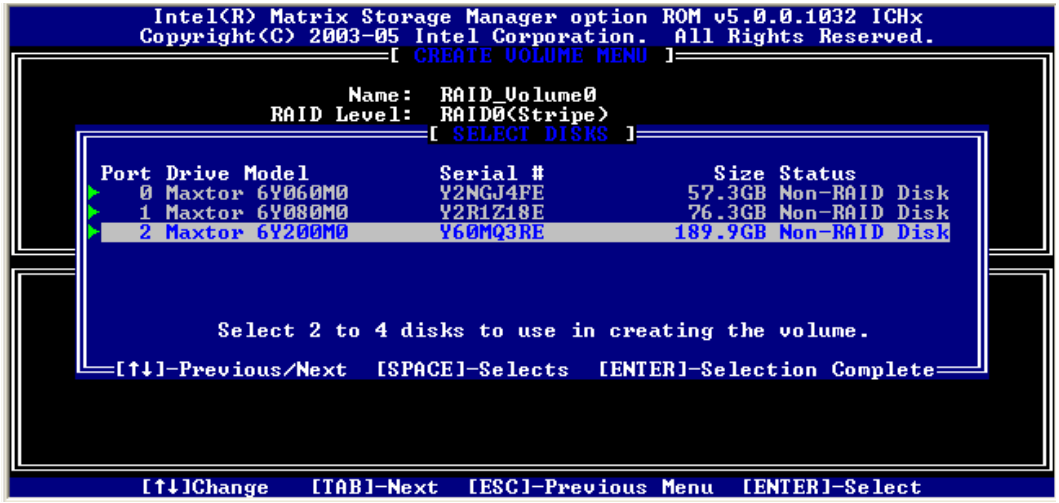
4. Specify the RAID level and then press the <TAB> or <ENTER> key to advance to the next field:


Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[CREATE VOLUME MENU]
Name: RAID_Volume0
RAID Level: RAID0(Stripe)
Disks: Select Disks
Strip Size: 128KB
Capacity: 0.0 GB
Create Volume
[HELP]
Press "ENTER" to select the physical disks to use.
[↑↓]Change [TAB]-Next [ESC]-Previous Menu [ENTER]-Select

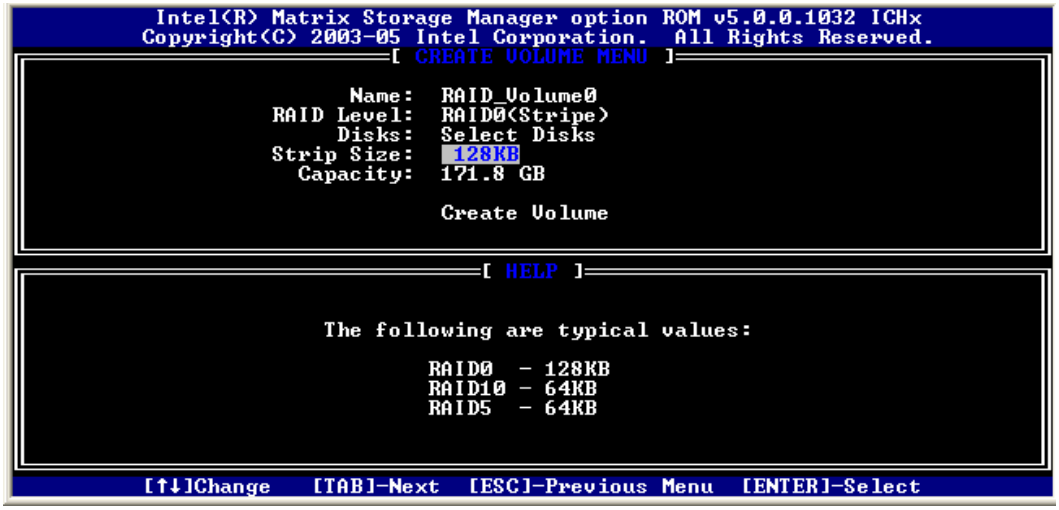
5. Press the <Enter> key to select the physical disks to use and the following prompt will appear:


Intel(R) Application Accelerator RAID Option ROM v4.0.0.6074
Copyright(C) 2003-04 Intel Corporation. All Rights Reserved.
[CREATE VOLUME MENU]
Name: RAID_Volume0
RAID Level: RAID0(Stripe)
[SELECT DISKS]
Port Drive Model Serial # Size Status
0 Maxtor 5T040H4 SN;0001 38.1GB Non-RAID Disk
1 Maxtor 5T040H4 SN;0006 38.1GB Non-RAID Disk
Select a minimum of two disks to use for creating the volume.
Select the disks to use for creating the volume.
[↑↓]-Previous/Next [SPACE]-Selects [ENTER]-Selection Complete
[↑↓]Change [TAB]-Next [ESC]-Previous Menu [ENTER]-Select

6. Select a minimum of two hard drives to use for creating the volume by using the [SPACE] bar to select. A green arrow will appear immediately to the left of the hard drives after they have been selected similar to the following:


Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[CREATE VOLUME MENU]
Name: RAID_Volume0
RAID Level: RAID0(Stripe)
[SELECT DISKS]
Port Drive Model Serial # Size Status
0 Maxtor 6Y060M0 Y2NGJ4FE 57.3GB Non-RAID Disk
1 Maxtor 6Y080M0 Y2R1Z18E 76.3GB Non-RAID Disk
2 Maxtor 6Y200M0 Y60MQ3RE 189.9GB Non-RAID Disk
Select 2 to 4 disks to use in creating the volume.
[↑↓]-Previous/Next [SPACE]-Selects [ENTER]-Selection Complete
[↑↓]Change [TAB]-Next [ESC]-Previous Menu [ENTER]-Select

7. Press the <ENTER> key after your selection is complete. The window will be returned to the main menu:

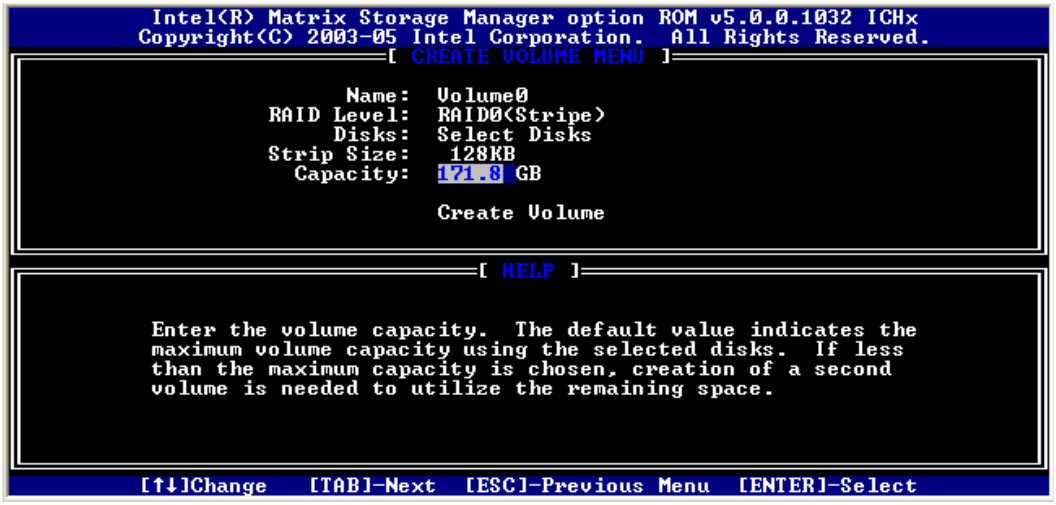


8. Select the strip size value for the RAID 0 array by scrolling through the available values by using the <↑> or <↓> keys and pressing the <Enter> key to select and advance to the next field.

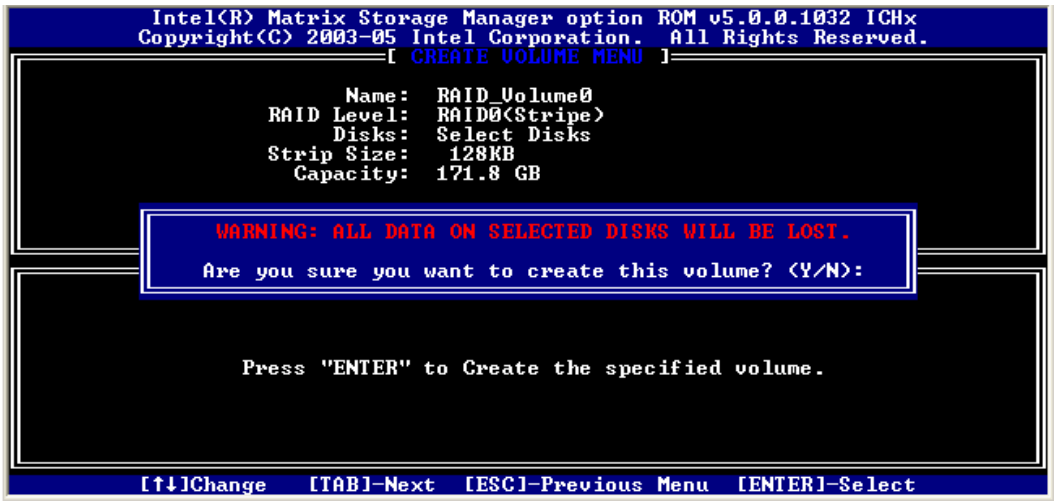
   - The available values range from 4KB to 128 KB in power of 2 increments. The strip value should be chosen based on the planned drive usage. Some suggested selections for RAID 0 are listed below.

   — 16 KB – Best for sequential transfers
   — 64 KB – Good general purpose strip size
   — 128 KB – Best performance for most desktops and workstations

9. Scroll down to 'Capacity', enter the volume capacity, and press <ENTER>. The default value indicates the maximum volume capacity using the selected disks. If less than the maximum volume capacity is chosen, creation of a second volume is needed to utilize the remaining space (i.e. a matrix RAID configuration).

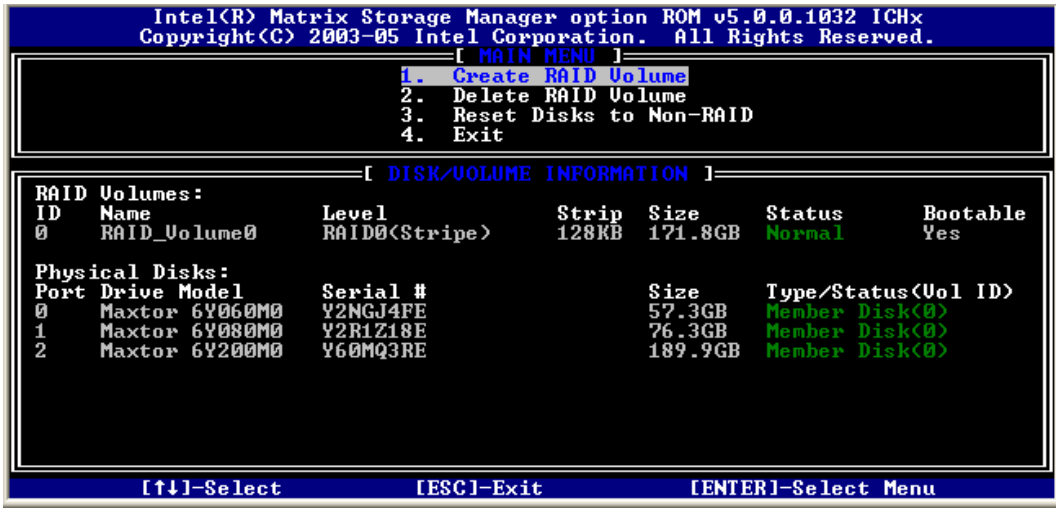

Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[CREATE VOLUME MENU]
Name: Volume0
RAID Level: RAID0(Stripe)
Disks: Select Disks
Strip Size: 128KB
Capacity: 171.8 GB
Create Volume
[HELP]
Enter the volume capacity. The default value indicates the maximum volume capacity using the selected disks. If less than the maximum capacity is chosen, creation of a second volume is needed to utilize the remaining space.
[↑↓]Change [TAB]-Next [ESC]-Previous Menu [ENTER]-Select

10. Scroll down to 'Create Volume' and press the <ENTER> key to create the specified volume. The following prompt will appear:

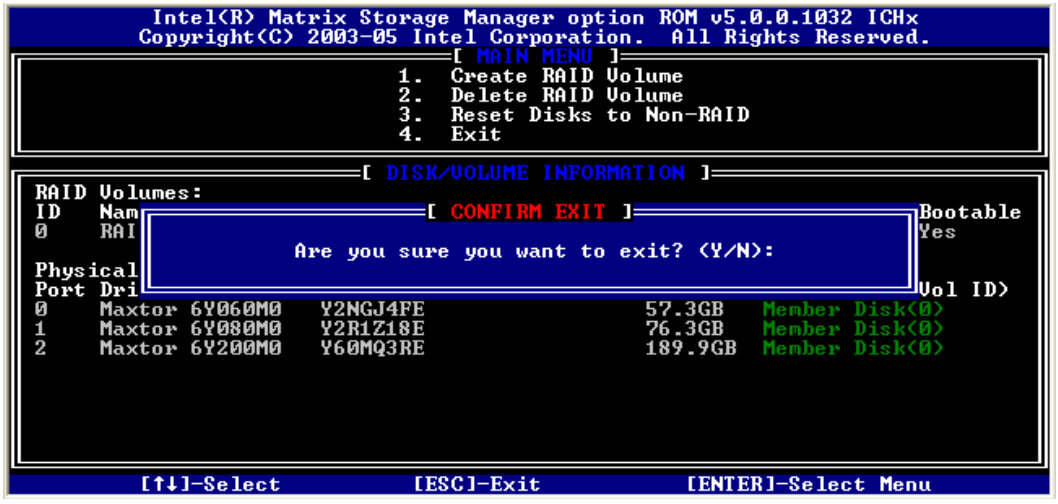

Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[CREATE VOLUME MENU]
Name: RAID_Volume0
RAID Level: RAID0(Stripe)
Disks: Select Disks
Strip Size: 128KB
Capacity: 171.8 GB
WARNING: ALL DATA ON SELECTED DISKS WILL BE LOST.
Are you sure you want to create this volume? (Y/N):
Press "ENTER" to Create the specified volume.
[↑↓]Change [TAB]-Next [ESC]-Previous Menu [ENTER]-Select

11. Confirm this selection by pressing the <Y> key after the prompt. The window will be returned to the main menu with an updated status similar to the following:

Note: The disk/volume information listed for your system can differ from the following example.


Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[MAIN MENU]
1. Create RAID Volume
2. Delete RAID Volume
3. Reset Disks to Non-RAID
4. Exit
[DISK/VOLUME INFORMATION]
RAID Volumes:
ID Name Level Strip Size Status Bootable
0 RAID_Volume0 RAID0(Stripe) 128KB 171.8GB Normal Yes
Physical Disks:
Port Drive Model Serial # Size Type/Status(Vol ID)
0 Maxtor 6Y060M0 Y2NGJ4FE 57.3GB Member Disk(0)
1 Maxtor 6Y080M0 Y2R1Z18E 76.3GB Member Disk(0)
2 Maxtor 6Y200M0 Y60MQ3RE 189.9GB Member Disk(0)
[↑↓]-Select [ESC]-Exit [ENTER]-Select Menu

12. Scroll to option 4 ‘Exit’ and press the <Enter> key to exit the Intel Matrix Storage Manager option ROM. The following prompt will appear:


Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[MAIN MENU]
1. Create RAID Volume
2. Delete RAID Volume
3. Reset Disks to Non-RAID
4. Exit
[DISK/VOLUME INFORMATION]
[CONFIRM EXIT]
Are you sure you want to exit? (Y/N):
[↑↓]-Select [ESC]-Exit [ENTER]-Select Menu

13. Confirm the exit by pressing <Y> key.

13.3.3 How To Delete a RAID Volume

Warning: All data on the RAID drives will be lost unless the volume that is selected is a RAID 1 volume.

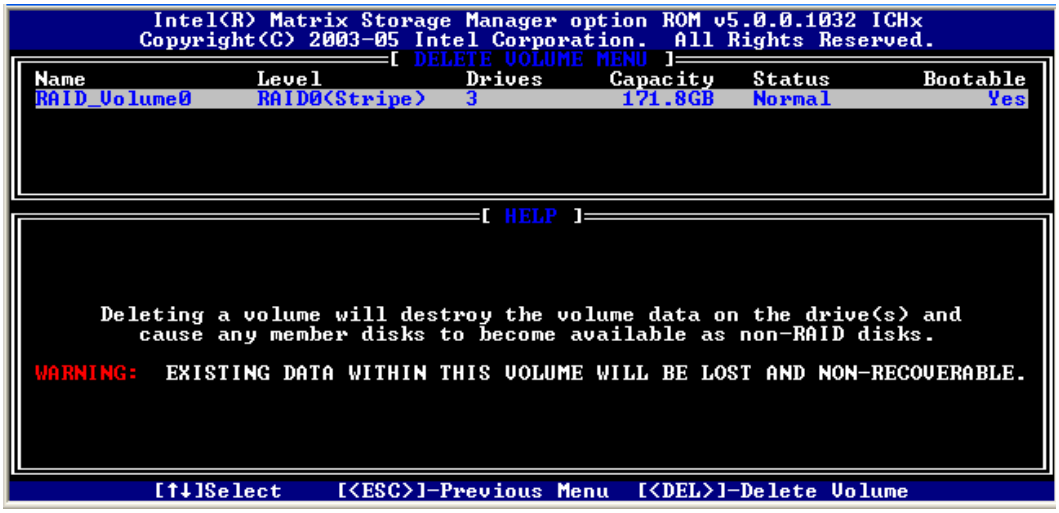
1. Select option 2 Delete RAID Volume and press the <Enter> key to delete the RAID volume.
2. Use the up and down arrow keys to select the volume you would like to delete.
3. Press the <Delete> key to delete the RAID volume. Confirm the volume deletion by pressing the <Y> key.

13.3.4 Example of RAID Volume Deletion

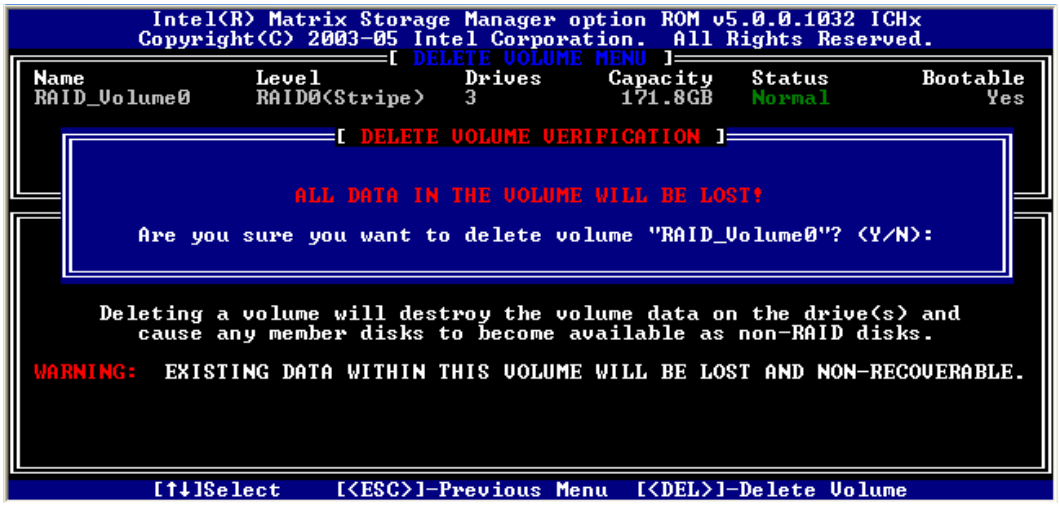
Warning: By performing this operation, all data on the RAID drives will be lost.

1. Select option 2 'Delete RAID Volume' from the main menu window and press the <Enter> key to select a RAID volume for deletion. The following window will appear:

Warning: If your system currently boots to RAID (has the operating system on the RAID volume) and you delete the RAID volume in the Intel Matrix Storage Manager option ROM, your system will become unbootable.


Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[DELETE VOLUME MENU]
Name Level Drives Capacity Status Bootable
RAID_Volume0 RAID0(Stripe) 3 171.8GB Normal Yes
[HELP]
Deleting a volume will destroy the volume data on the drive(s) and cause any member disks to become available as non-RAID disks.
WARNING: EXISTING DATA WITHIN THIS VOLUME WILL BE LOST AND NON-RECOVERABLE.
[↑↓]Select [<ESC>]-Previous Menu [<DEL>]-Delete Volume

2. Select the volume and press the <Delete> key to delete the RAID volume and the following prompt will appear:


Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[DELETE VOLUME MENU]
Name Level Drives Capacity Status Bootable
RAID_Volume0 RAID0(Stripe) 3 171.8GB Normal Yes
[DELETE VOLUME VERIFICATION]
ALL DATA IN THE VOLUME WILL BE LOST!
Are you sure you want to delete volume "RAID_Volume0"? (Y/N):
Deleting a volume will destroy the volume data on the drive(s) and cause any member disks to become available as non-RAID disks.
WARNING: EXISTING DATA WITHIN THIS VOLUME WILL BE LOST AND NON-RECOVERABLE.
[↑↓]Select [<ESC>]-Previous Menu [<DEL>]-Delete Volume

3. Confirm the volume deletion by pressing the <Y> key.

13.3.5 How To Reset Disks to Non-RAID

Note: Possible reasons to 'Reset Disks to Non-RAID' could include issues such as incompatible RAID configurations, a failed volume or a failed member of a RAID 0 volume.

Warning: All data on the RAID drives and any internal RAID structures will be lost unless the drives are members of a RAID 1 volume. Resetting drives that are members of a RAID 1 volume to non-RAID will not result in the loss of data on those member drives.

1. Select option 3 'Reset Disks to Non-RAID' and press the <Enter> key to delete the RAID set and remove any RAID structures from the drives.

2. In the selection screen, use the <space> bar to select the drives you would like to reset. Press <Enter> after selecting the drives.

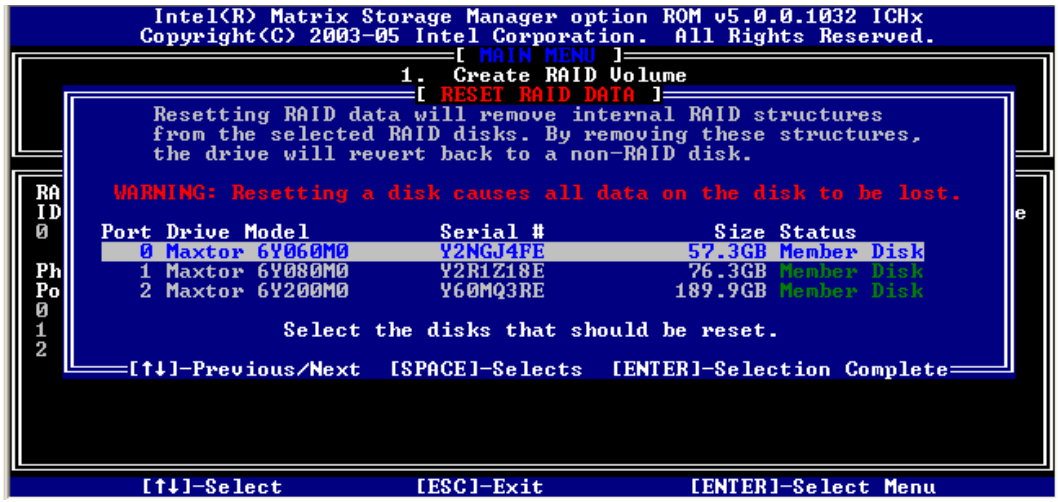
3. Confirm the selection by pressing the <Y> key.

13.3.6 Example of Resetting Disks to Non-RAID

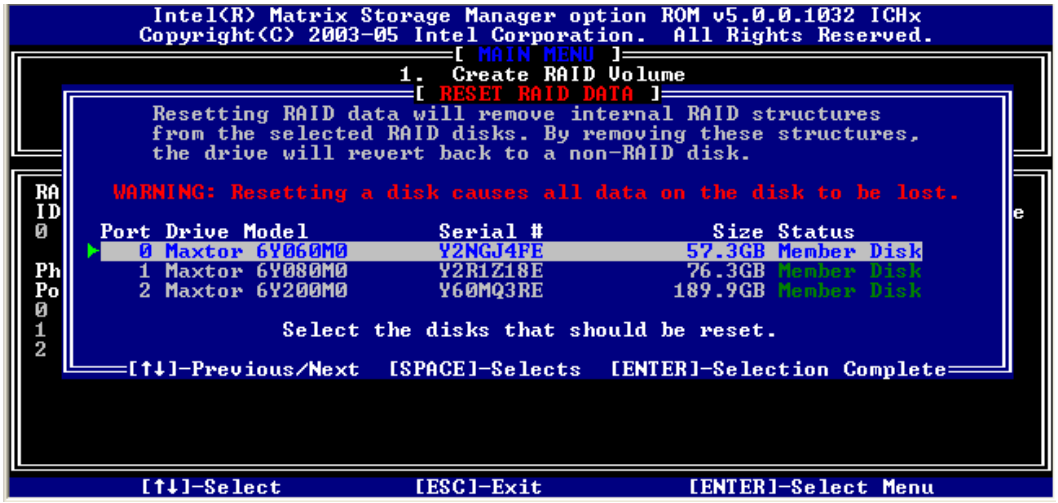
Note: Possible reasons to 'Reset Disks to Non-RAID' could include issues such as configurations, a failed volume or a failed member of a RAID 0 volume.

Warning: By performing this operation, all data on the RAID drives and any internal RAID structures will be lost.

1. Select option 3 'Reset Disks to Non-RAID' and press the <Enter> key to delete the RAID volume and remove any RAID structures from the drives and the following window will appear:


Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[MAIN MENU]
1. Create RAID Volume
[RESET RAID DATA]
Resetting RAID data will remove internal RAID structures
from the selected RAID disks. By removing these structures,
the drive will revert back to a non-RAID disk.
WARNING: Resetting a disk causes all data on the disk to be lost.
Port Drive Model Serial # Size Status
0 Maxtor 6Y060M0 Y2NGJ4FE 57.3GB Member Disk
1 Maxtor 6Y080M0 Y2R1Z18E 76.3GB Member Disk
2 Maxtor 6Y200M0 Y60MQ3RE 189.9GB Member Disk
Select the disks that should be reset.
[↑↓]-Previous/Next [SPACE]-Selects [ENTER]-Selection Complete
[↑↓]-Select [ESC]-Exit [ENTER]-Select Menu

2. Select the hard drives that should be reset by using the [SPACE] bar to select. A green arrow will appear immediately to the left of the hard drives after they have been selected similar to the following:


Intel(R) Matrix Storage Manager option ROM v5.0.0.1032 ICHx
Copyright(C) 2003-05 Intel Corporation. All Rights Reserved.
[MAIN MENU]
1. Create RAID Volume
[RESET RAID DATA]
Resetting RAID data will remove internal RAID structures
from the selected RAID disks. By removing these structures,
the drive will revert back to a non-RAID disk.
WARNING: Resetting a disk causes all data on the disk to be lost.
Port Drive Model Serial # Size Status
0 Maxtor 6Y060M0 Y2NGJ4FE 57.3GB Member Disk
1 Maxtor 6Y080M0 Y2R1Z18E 76.3GB Member Disk
2 Maxtor 6Y200M0 Y60MQ3RE 189.9GB Member Disk
Select the disks that should be reset.
[↑↓]-Previous/Next [SPACE]-Selects [ENTER]-Selection Complete
[↑↓]-Select [ESC]-Exit [ENTER]-Select Menu

3. Press the <ENTER> key to complete the selection.

4. Confirm the selection by pressing the <Y> key.

14 Loading the Intel Matrix Storage Manager Driver During Operating System Install

The Intel Matrix Storage Manager driver can be loaded during Windows* operating system installation..

14.1 Instructions on Creating F6 Floppy Diskette

To **automatically** create the F6 floppy diskette, download the latest Floppy Configuration Utility from the Intel download site: http://downloadfinder.intel.com/scripts-df/Product_Filter.asp?ProductID=2101 and run the .EXE file.

Note: Use the instructions in the F6README.txt to determine whether the system contains a 32-bit or 64-bit processor. Use F6flpy32.exe on a 32-bit system. Use F6flpy64.exe on a 64-bit system.

To **manually** create an F6 floppy diskette that contains the files that are needed when installing the driver by the F6 installation method, complete the following steps:

1. Download the Intel Matrix Storage Manager (or use the CD shipped with your motherboard which contains the Intel Matrix Storage Manager). The Intel Matrix Storage Manager can be downloaded from the following website:
   http://downloadfinder.intel.com/scripts-df/Product_Filter.asp?ProductID=2101

2. The following files need to be extracted from the compressed .CAB file (which is contained inside the Intel Matrix Storage Manager .EXE package): IAAHCI.CAT, IAACHI.INF, IASTOR.CAT, IASTOR.INF, IASTOR.SYS, and TXTSETUP.OEM.

3. To extract these files, run 'C:\IATA5X_MULTI.EXE –A -A -P C:\<path>' (as described in the ‘Advanced Installation Instructions’ section of the README.TXT.)

4. After these files have been extracted, copy the IAAHCI.CAT, IAACHI.INF, IASTOR.CAT, IASTOR.INF, IASTOR.SYS, and TXTSETUP.OEM. files to a floppy diskette. If the system has a 32-bit processor, copy the files found in the Drivers folder; if the system has a 64-bit processor, copy the files found in the Drivers64 folder. Note: These files should be placed in the root directory of the floppy.

Note: Any spaces in the pathname or filename require quotes around the pathname or filename. The switches do not require quotes. For example:

“C:\My Documents\setup.exe” –A –P

14.2 Installation Using F6 Method

When you start the installation of Windows* XP, you probably will be shown a message stating, 'Setup could not determine the type of one or more mass storage devices installed in your system'. If this occurs, the instructions below explain how to install the RAID driver. To install the Intel Matrix Storage Manager driver using the F6 installation method, complete the following steps:

Note: After completing these steps and after the operating system has been successfully installed, you will still need to install the Intel Matrix Storage Manager by running the typical Setup.exe process.

1. Press F6 when prompted in the status line with the 'Press F6 if you need to install a third party SCSI or RAID driver' message at the beginning of Windows XP setup (during text-mode phase). Note: After pressing F6, setup will temporarily continue loading drivers and then you will be prompted with a screen to load support for mass storage device(s).

2. Press the 'S' key to 'Specify Additional Device'.

3. You will be prompted to 'Please insert the disk labeled Manufacturer-supplied hardware support disk into Drive A:' After you see the prompt, insert the floppy disk containing the following files: IAAHCI.CAT, IAACHI.INF, IASTOR.CAT, IASTOR.INF, IASTOR.SYS, and TXTSETUP.OEM. and press ENTER.

Note: See Section 14.1 titled 'Instructions on Creating F6 Floppy Diskette' for instructions on how to extract these files from the Intel Matrix Storage Manager Setup.exe file.

4. After pressing ENTER, you should be shown a list of available SCSI Adapters; it should list your particular RAID or AHCI controller. Select the entry that corresponds to your BIOS setup and press ENTER.

5. The next screen should confirm that you have selected the Intel(R) RAID or AHCI controller. Press ENTER again to continue.

6. At this point, you have successfully F6 installed the Intel Matrix Storage Manager driver and Windows XP setup should continue. Leave the floppy disk in the floppy drive until the system reboots itself because Windows* setup will need to copy the files again from the floppy to the Windows installation folders. After Windows setup has copied these files again, remove the floppy diskette so that Windows setup can reboot as needed.

15 Installing the Intel Matrix Storage Manager

15.1 Installation Caution

Caution: The Intel Matrix Storage Manager driver may be used to operate the hard drive from which the system is booting or a hard drive that contains important data. For this reason, you cannot remove or un-install this driver from the system after installation; however, you will have the ability to un-install all other non-driver components.

The following non-driver components can be un-installed:

- Intel Matrix Storage Console
- Help Documentation
- Start Menu Shortcuts
- System Tray Icon Service
- RAID Monitor Service

15.2 Steps to Take Before Installing the Intel Matrix Storage Manager

15.2.1 Resolve Conflicts in Device Manager

Before installing the Intel Matrix Storage Manager, there should be NO conflicts (e.g. yellow exclamation points or red X's) in Device Manager under Hard Disk Controllers. Device Manager can be accessed by going to: Start Button / Settings / Control Panel / System / Device Manager. Often, installing the Intel® Chipset Software Installation Utility will resolve conflicts where the operating system does not properly recognize the Intel device.

Please refer to Appendix A for additional information on the Intel Chipset Software Installation Utility.

15.3 Obtaining and Installing the Intel Matrix Storage Manager

The Intel Matrix Storage Manager is probably supplied on a CD-ROM that was included with your motherboard or system.

If needed, the Intel Matrix Storage Manager can also be downloaded from the following Intel website: http://downloadfinder.intel.com/scripts-df/Product_Filter.asp?ProductID=2101

The Intel Matrix Storage Manager is available for supported operating systems (*see http://support.intel.com/support/chipsets/imsm/sb/CS-020644.htm*) in both English (iata5x_enu.exe) and multi-language (iata5x_multi.exe) versions. An included README.TXT file covers topics such as system requirements and basic and advanced installation instructions.

A Release Notes document is located at the following website:
http://downloadfinder.intel.com/scripts-df/Product_Filter.asp?ProductID=2101

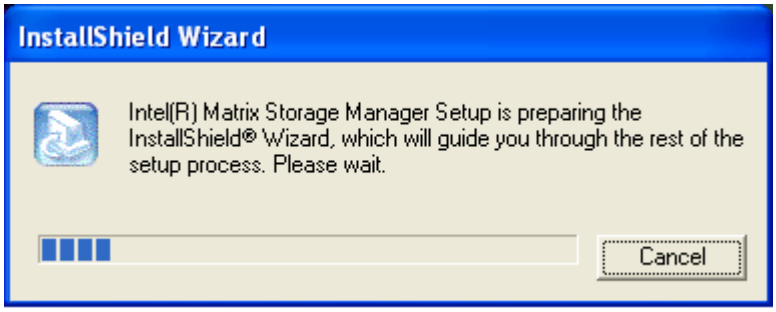
A Known Compatibility Issues document is located at the following website:
http://support.intel.com/support/chipsets/imst/sb/CS-012524.htm

After the Intel Matrix Storage Manager has been downloaded from the Intel website to a known location on your hard drive, you need to run the file iata5x_enu.exe (English version) or iata5x_multi.exe (multi-language). Running the file can be done by double-clicking on the file name. The installation program should launch after you double-click on the file name. Click on the “Next” button at the Welcome screen. Read the license agreement and click on the “Yes” button to accept the license terms and continue. Click on the “Next” button to install the driver in the default folder location. Click on the “Next” button to create the default Program Folder. The driver files will now be installed. After you have finished installing, select the “Yes” button for the reboot option and click on the “Finish" button to restart your computer. The Intel Matrix Storage Manager should now be installed.

Note: The instructions above assume that the Intel Matrix Storage Manager option ROM and BIOS have been configured correctly and the RAID driver has been installed using the F6 installation method (see Section 14.1 titled ‘Installation Using F6 Method’ for additional information).

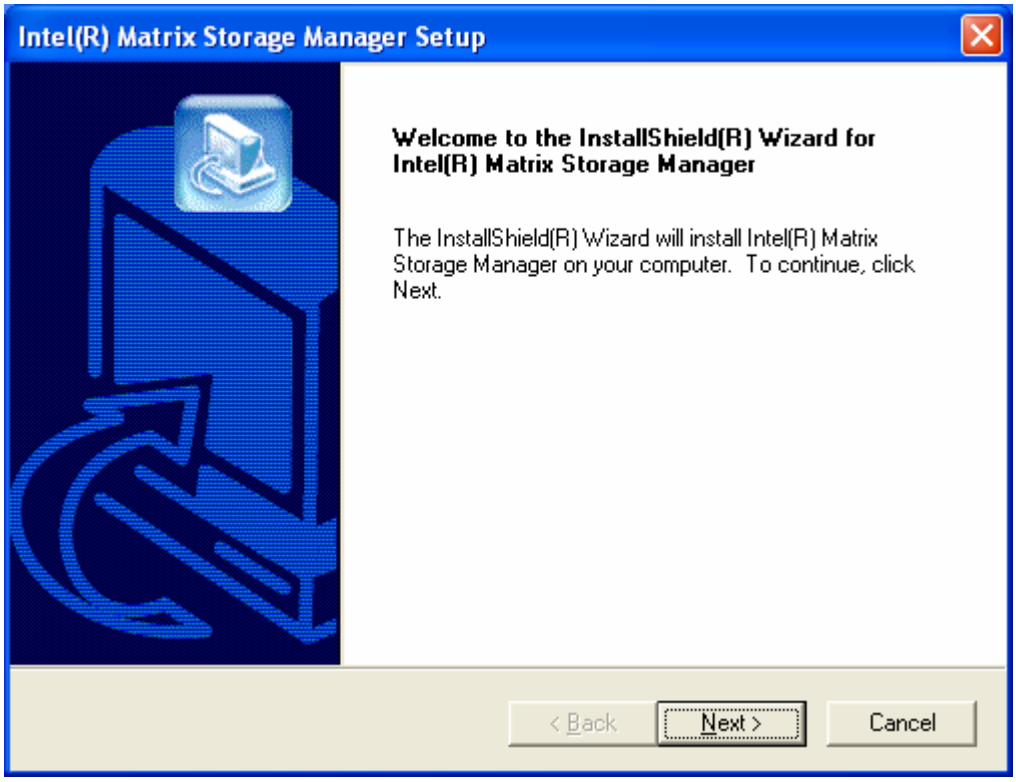
15.3.1 Installation Steps

After you click on the .EXE file, installation will begin and the following screen will temporarily appear:


InstallShield Wizard
Intel(R) Matrix Storage Manager Setup is preparing the InstallShield® Wizard, which will guide you through the rest of the setup process. Please wait.
Cancel

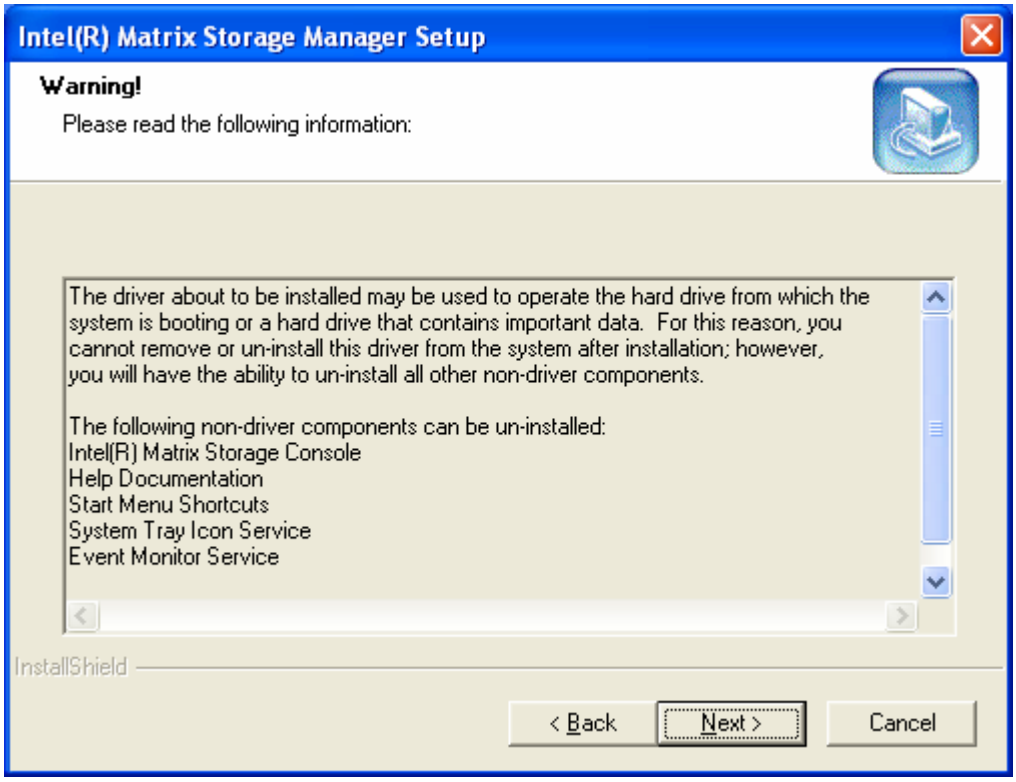
15.3.2 Installation: Welcome Screen

Click on the ‘Next’ button after the following welcome window appears:


Intel(R) Matrix Storage Manager Setup
Welcome to the InstallShield(R) Wizard for Intel(R) Matrix Storage Manager
The InstallShield(R) Wizard will install Intel(R) Matrix Storage Manager on your computer. To continue, click Next.
< Back
Next >
Cancel

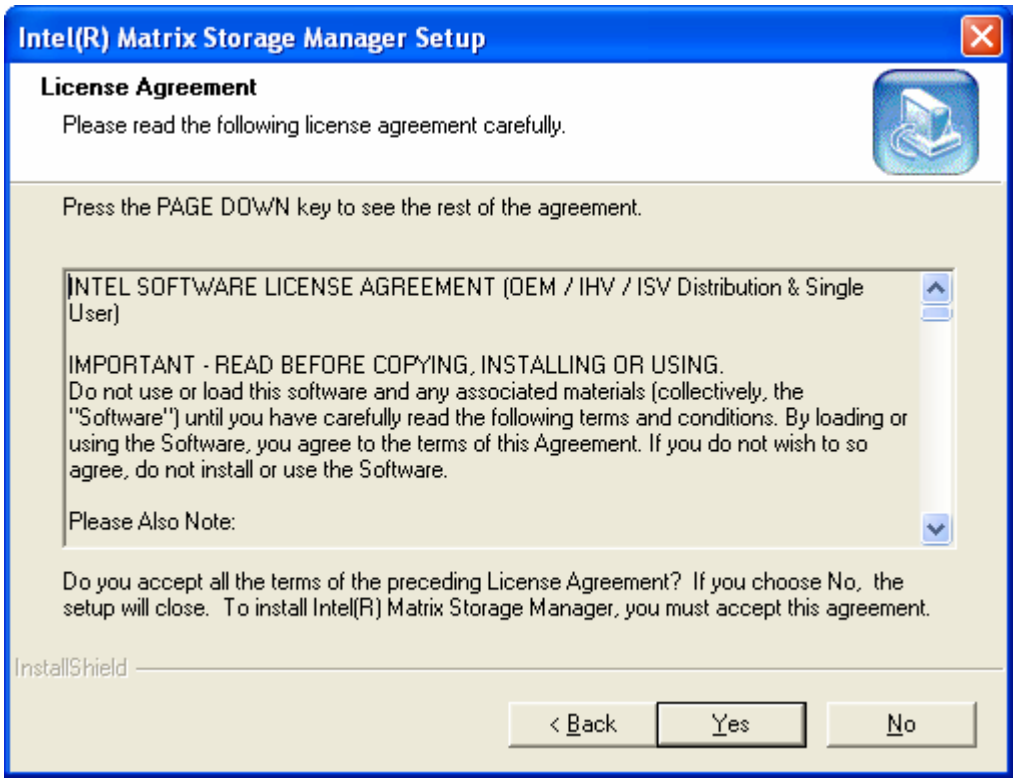
15.3.3 Installation: Uninstall Warning

Carefully read through the uninstall warning in the following window and then click on the 'Next' button:


Intel(R) Matrix Storage Manager Setup
Warning!
Please read the following information:
The driver about to be installed may be used to operate the hard drive from which the system is booting or a hard drive that contains important data. For this reason, you cannot remove or un-install this driver from the system after installation; however, you will have the ability to un-install all other non-driver components.
The following non-driver components can be un-installed:
Intel(R) Matrix Storage Console
Help Documentation
Start Menu Shortcuts
System Tray Icon Service
Event Monitor Service
InstallShield
< Back
Next >
Cancel

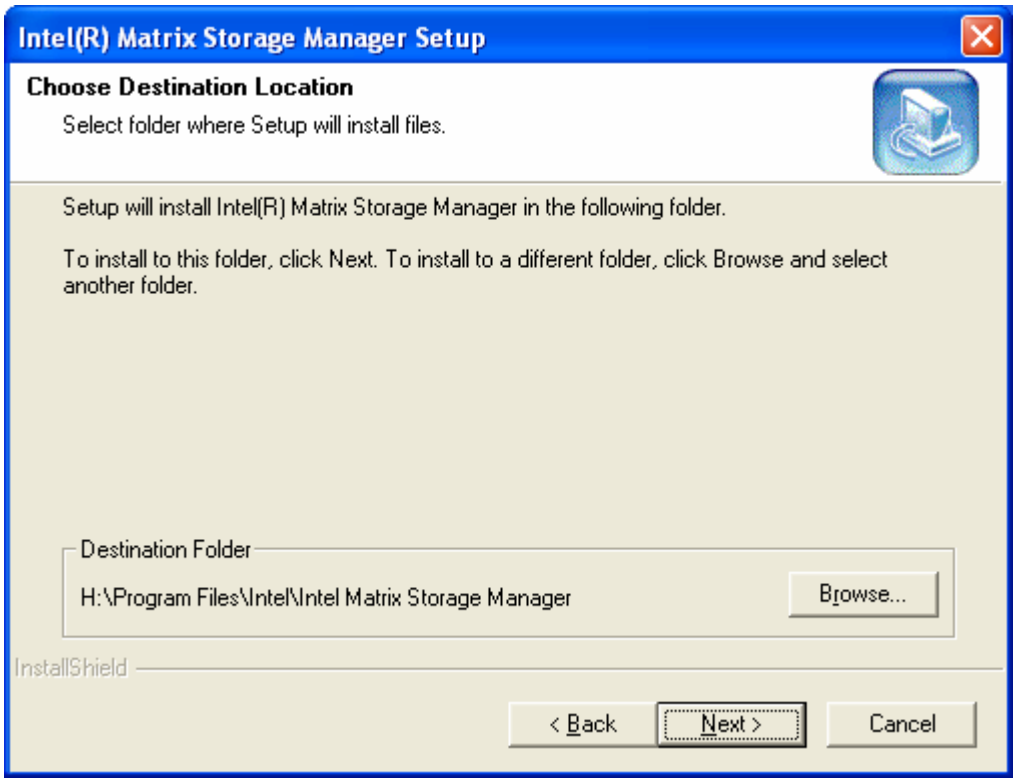
15.3.4 Installation: License Agreement

Carefully read through the uninstall warning in the following window and then click on the 'Next' button:


Intel(R) Matrix Storage Manager Setup
License Agreement
Please read the following license agreement carefully.
Press the PAGE DOWN key to see the rest of the agreement.
INTEL SOFTWARE LICENSE AGREEMENT (OEM / IHV / ISV Distribution & Single User)
IMPORTANT - READ BEFORE COPYING, INSTALLING OR USING.
Do not use or load this software and any associated materials (collectively, the "Software") until you have carefully read the following terms and conditions. By loading or using the Software, you agree to the terms of this Agreement. If you do not wish to so agree, do not install or use the Software.
Please Also Note:
Do you accept all the terms of the preceding License Agreement? If you choose No, the setup will close. To install Intel(R) Matrix Storage Manager, you must accept this agreement.
InstallShield
< Back
Yes
No

15.3.5 Installation: Choose Destination Location

Select the folder in the following window where you would like Setup to install the files and then click on the 'Next' button:


Intel(R) Matrix Storage Manager Setup
Choose Destination Location
Select folder where Setup will install files.
Setup will install Intel(R) Matrix Storage Manager in the following folder.
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.
Destination Folder
H:\Program Files\Intel\Intel Matrix Storage Manager
Browse...
InstallShield
< Back
Next >
Cancel

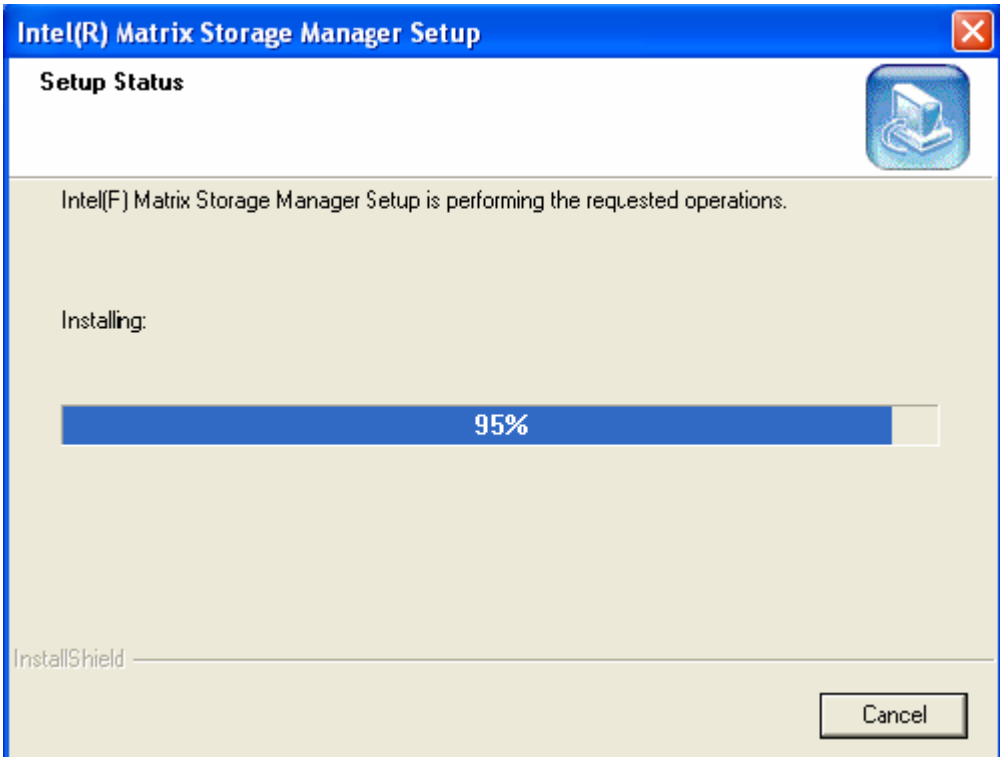
15.3.6 Installation: Select Program Folder

Select a program folder in the following window where you would like Setup to add the program icons:

Intel(R) Matrix Storage Manager Setup
Select Program Folder
Please select a program folder.
Setup will add program icons to the Program Folder listed below. You may type a new folder name, or select one from the existing folders list. Click Next to continue.
Program Folders:
Intel(R) Matrix Storage Manager
Existing Folders:
Accessories
Administrative Tools
Games
Intel(R) Matrix Storage Manager
Startup
InstallShield
< Back
Next >
Cancel

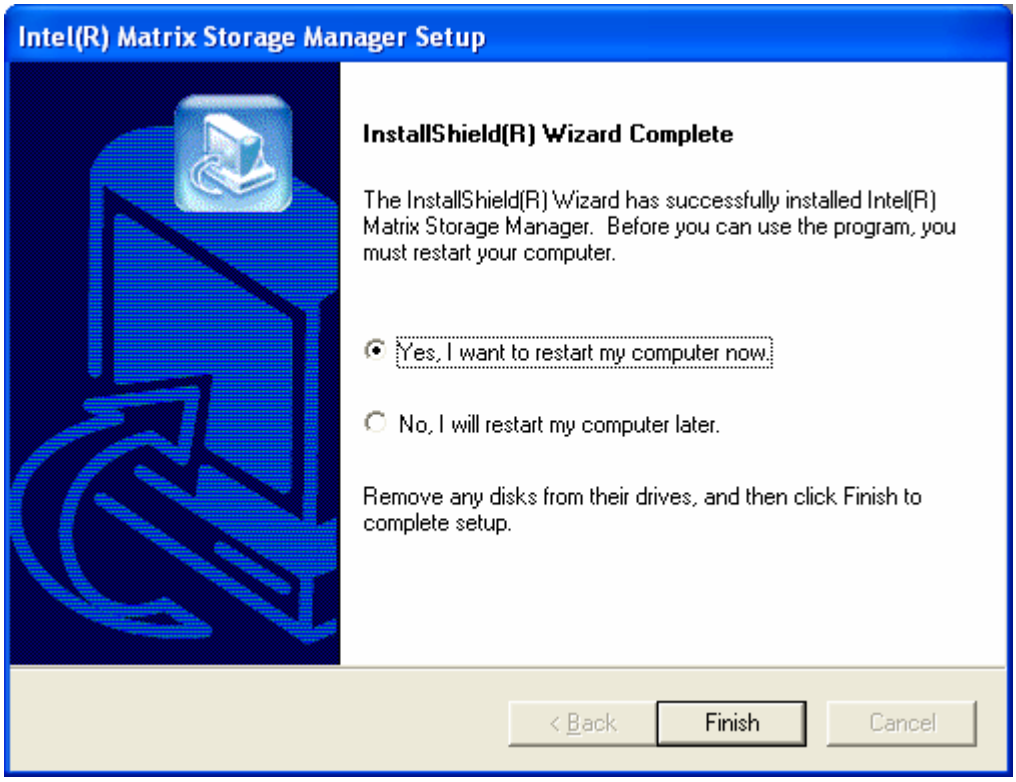
15.3.7 Installation: Setup Status

The status of the Intel Matrix Storage Manager Setup will then appear in the following window:



15.3.8 Installation: InstallShield* Wizard Complete

After installation is complete, the following window will appear. Select 'Finish':


Intel(R) Matrix Storage Manager Setup
InstallShield(R) Wizard Complete
The InstallShield(R) Wizard has successfully installed Intel(R) Matrix Storage Manager. Before you can use the program, you must restart your computer.
Yes, I want to restart my computer now.
No, I will restart my computer later.
Remove any disks from their drives, and then click Finish to complete setup.
< Back
Finish
Cancel

15.4 Confirming Installation of Intel Matrix Storage Manager

To confirm that the Intel Matrix Storage Manager has been installed, complete the following steps:

- Click on Start Button / All Programs
- Find the 'Intel Matrix Storage Manager' program group
- Select the 'Intel® Matrix Storage Console' shortcut
- The Intel Matrix Storage Console should be shown

If installation was done by have-disk, F6, or an unattended installation method, you can confirm that the Intel Matrix Storage Manager has been loaded by completing the following steps:

Note: The following instructions assume classic mode in Windows* XP:

- Click on Start Button / Control Panel

- Double-click on the ‘System’ icon
- Select the 'Hardware' tab
- Select 'Device Manager' button
- Expand the 'SCSI and RAID Controllers' entry
- Right-click on the ‘Intel(R) 82801GR/GH SATA RAID Controller’
- Select the 'Driver' tab
- Select the 'Driver Details' button

15.5 Identifying Version of Intel Matrix Storage Manager Installed

There are two ways to determine which version of the Intel Matrix Storage Manager is installed:

- Use the Intel Matrix Storage Console
- Locate the RAID driver (iaStor.sys) file and view the file properties

15.5.1 Using the Intel Matrix Storage Console:

- Run the Intel Matrix Storage Console from the following Start Menu path:
  - Windows XP: Start → All Programs → Intel Matrix Storage Manager → Intel Matrix Storage Console
  - Windows 2000: Start → Programs → Intel Matrix Storage Manager → Intel Matrix Storage Console
- Click the ‘Device Information’ tab
- ·Single left-mouse click on the ‘Intel(R) 82801GR/GH SATA RAID Controller’ item in the Devices tree
- Note: the specific Intel SATA RAID Controller depends on your system, but will be in the format “82801xR”

- Look for a parameter in the Parameters list box titled ‘Driver Version’. The version number should be listed in the following format:
  — 5.0.0.xxxx

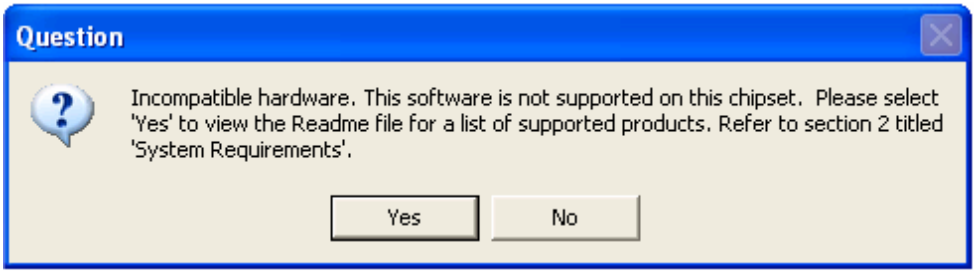
15.5.2 RAID Driver File Properties:

- Locate the file “iaStor.sys” in the following path:
  — <System Root>\Windows\System32\Drivers
- Single right-mouse click on “iaStor.sys” and select ‘Properties’
- Select the ‘Version’ tab
- A parameter called “File version” should be located at the top of this tab’s view. Next to it will be the RAID driver version. The version number should be listed in the following format:
  — 5.0.0.xxxx

16 Issues During Installation

16.1 Incompatible Hardware Error Message

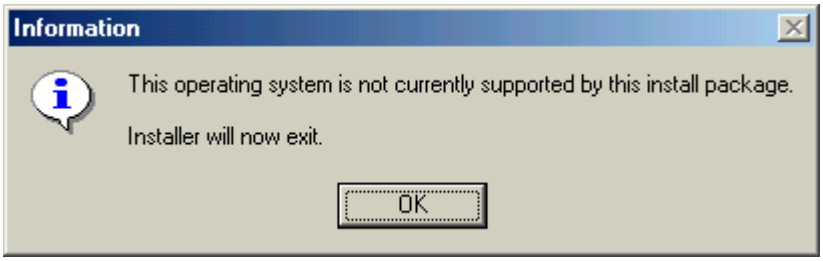
Issue: The following error message occurs during installation:


Question
Incompatible hardware. This software is not supported on this chipset. Please select 'Yes' to view the Readme file for a list of supported products. Refer to section 2 titled 'System Requirements'.
Yes
No

Resolution: This issue is resolved by installing the Intel Matrix Storage Manager on a system with a supported Intel chipset.
(*see* *http://support.intel.com/support/chipsets/imst/sb/CS-020644.htm*).

16.2 Operating System Not Supported Error Message

Issue: The following error message occurs during installation:



Resolution: This issue is resolved by installing the Intel Matrix Storage Manager on a system with a supported operating system.
(*see* *http://support.intel.com/support/chipsets/imsm/sb/CS-020648.htm*)

Note: Note for Windows* XP users: To successfully complete installation of the Intel Matrix Storage Manager with Windows* XP, the user must be logged on with Administrator rights.

17 "RAID Ready"

A "RAID Ready" system is a specific system configuration that enables a seamless migration from a single non-RAID disk drive to a RAID 0, RAID 1, RAID 5, or RAID 10 array. The Intel Matrix Storage Manager offers the flexibility to upgrade from a single Serial ATA (SATA) hard drive to a RAID 0, RAID 1, RAID 5, or RAID 10 configuration when one or more SATA hard drives are added to the system. This process will create a new RAID volume from an existing disk.

17.1 "RAID Ready" System Requirements

In order for a system to be considered "RAID Ready", it must meet all of the following requirements:

1. System must contain a supported Intel chipset and one Serial ATA (SATA) hard drive
2. RAID controller must be enabled in the BIOS
3. Motherboard BIOS must include the Intel Matrix Storage Manager option ROM
4. Intel Matrix Storage Manager must be loaded

17.2 Steps to Set Up a "RAID Ready" System

To set up a "RAID Ready" system, complete the following steps:

Note: The system must meet all the "RAID Ready" system requirements specified in Section 17.1.

1. Install Intel Matrix Storage Manager driver during operating system installation or pre-installed driver on a SATA hard drive (configured as non-RAID disk – also known as RAID Ready Mode)
2. Install Intel Matrix Storage Manager driver from within the operating system to add Start Menu links and the Intel Matrix Storage Console

17.3 Converting "RAID Ready" System into RAID System Using the Migration Feature

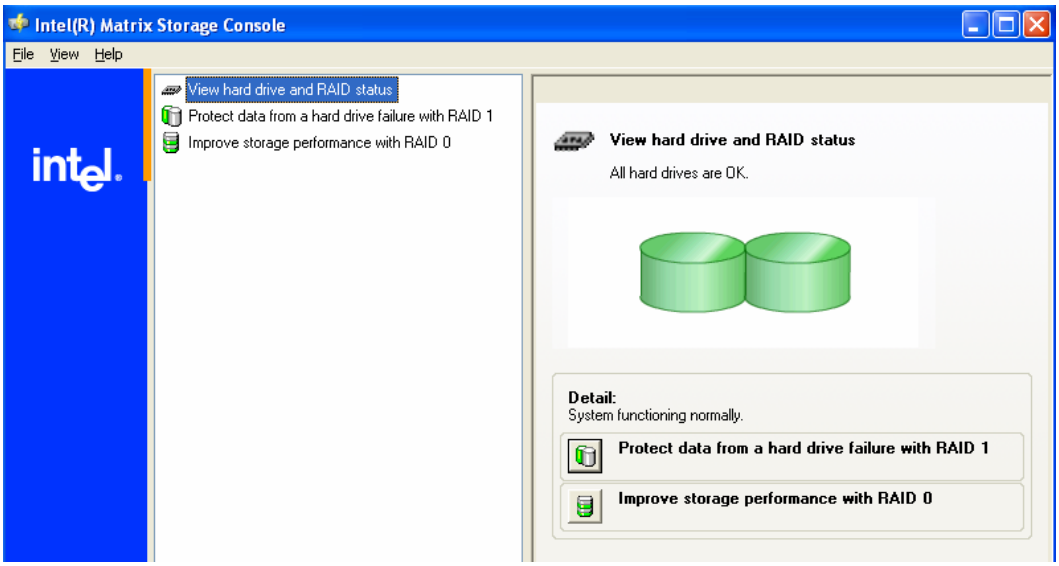
17.3.1 Converting "RAID Ready" System into RAID 0 or RAID 1 System With Two Hard Drives

Note: The steps listed in this section assume that the operating system has been installed on an existing Serial ATA hard drive and the required driver was installed during the operating system setup.

Warning: This operation will delete all existing data from the additional hard drive or drives and the data cannot be recovered. It is critical to backup all important data on the additional drives before proceeding. The data on the source hard drive, however, will be preserved.

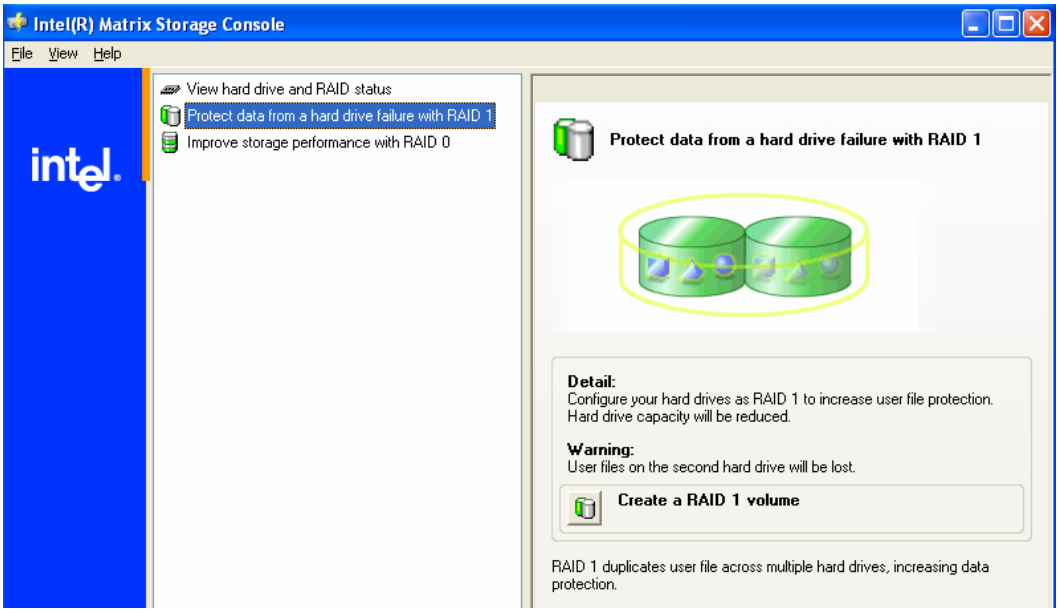
To turn a RAID Ready system into a RAID 0 or RAID 1 system using two hard drives, complete the following steps:

1. Physically add an additional Serial ATA hard drive to the system
2. Boot to Windows* and install the Intel Matrix Storage Manager (if needed)
3. Open the Intel Matrix Storage Console (Start/All Programs/Intel Matrix Storage Manager/Intel Matrix Storage Console)
4. The Intel Matrix Storage Console user interface should look as follows:


Intel(R) Matrix Storage Console
File View Help
View hard drive and RAID status
Protect data from a hard drive failure with RAID 1
Improve storage performance with RAID 0
View hard drive and RAID status
All hard drives are OK.
Detail:
System functioning normally.
Protect data from a hard drive failure with RAID 1
Improve storage performance with RAID 0

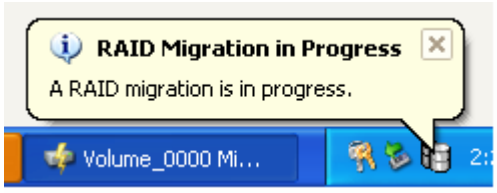
Note: If the user interface does not look similar to the view displayed above, switch to the Basic mode by clicking on the 'View' menu, then selecting 'Basic mode'.

5. Click on the 'Protect data from a hard drive failure with RAID 1' or 'Improve storage performance with RAID 0' icon in the right-hand pane to create a RAID volume.
6. Click on the 'Create a RAID x volume' icon to begin the migration process. In the following example, RAID 1 was selected.

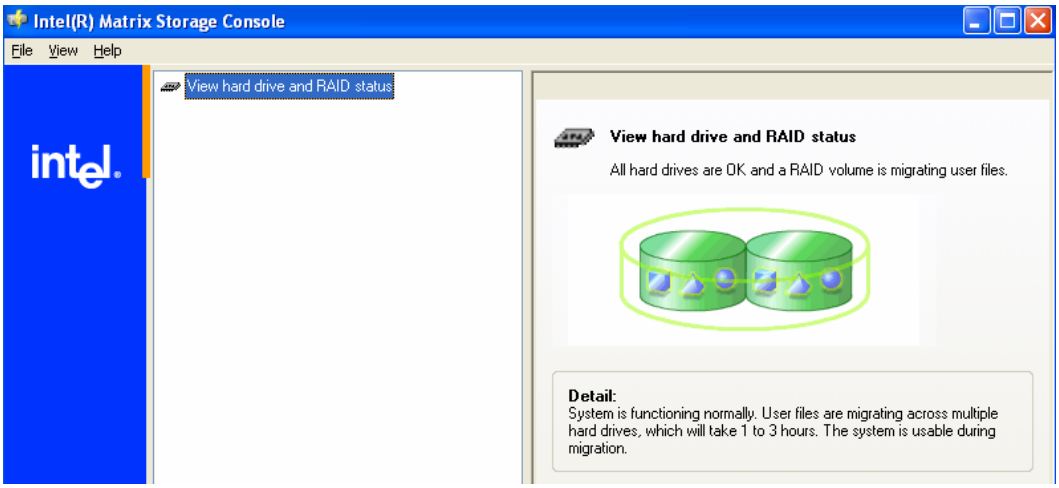

Intel(R) Matrix Storage Console
File View Help
View hard drive and RAID status
Protect data from a hard drive failure with RAID 1
Improve storage performance with RAID 0
Protect data from a hard drive failure with RAID 1
Detail:
Configure your hard drives as RAID 1 to increase user file protection.
Hard drive capacity will be reduced.
Warning:
User files on the second hard drive will be lost.
Create a RAID 1 volume
RAID 1 duplicates user file across multiple hard drives, increasing data protection.

7. Click 'yes' to confirm.

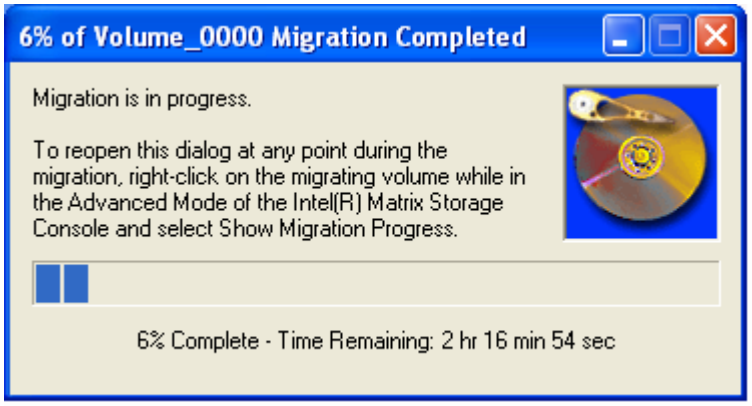
8. The tray icon will indicate that the migration is in progress.



9. While the migration is in progress, the status of the user interface will appear as follows:


Intel(R) Matrix Storage Console
File View Help
View hard drive and RAID status
intel.
View hard drive and RAID status
All hard drives are OK and a RAID volume is migrating user files.
Detail:
System is functioning normally. User files are migrating across multiple hard drives, which will take 1 to 3 hours. The system is usable during migration.

10. A progress dialog will display the status of the migration as a percentage complete, as shown in the following dialog:


6% of Volume_0000 Migration Completed
Migration is in progress.
To reopen this dialog at any point during the migration, right-click on the migrating volume while in the Advanced Mode of the Intel(R) Matrix Storage Console and select Show Migration Progress.
6% Complete - Time Remaining: 2 hr 16 min 54 sec

11. When the migration is complete, reboot the system.

12. Optional: Use 3rd party application or Windows* to create and format a new data partition on unused space, if any (see Note below)

17.3.2 Converting "RAID Ready" System into RAID System With Three or Four Hard Drives

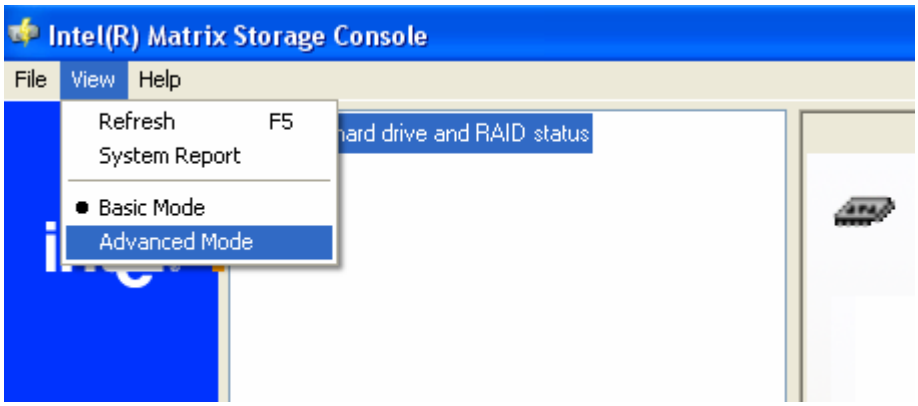
To turn a RAID Ready system into a RAID 0, RAID 5, or RAID 10 system using three or four hard drives, complete the following steps:

1. Physically add two or more additional Serial ATA hard drives to the system

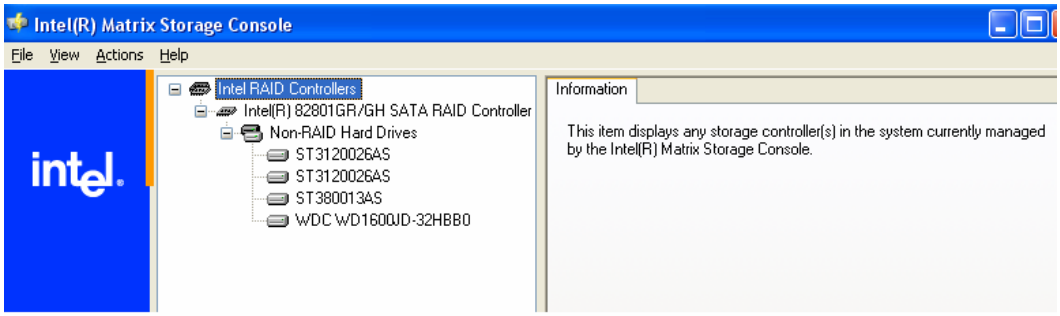
2. Boot to Windows* and install the Intel Matrix Storage Manager (if needed)

3. Open the Intel Matrix Storage Console (Start/All Programs/Intel Matrix Storage Manager/Intel Matrix Storage Console)

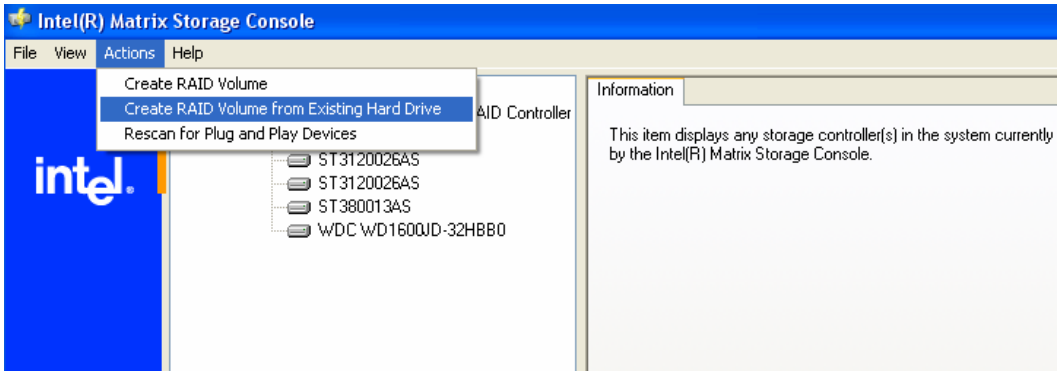
4. Switch to the Advanced mode (View menu, Advanced Mode) as demonstrated in the following dialog:



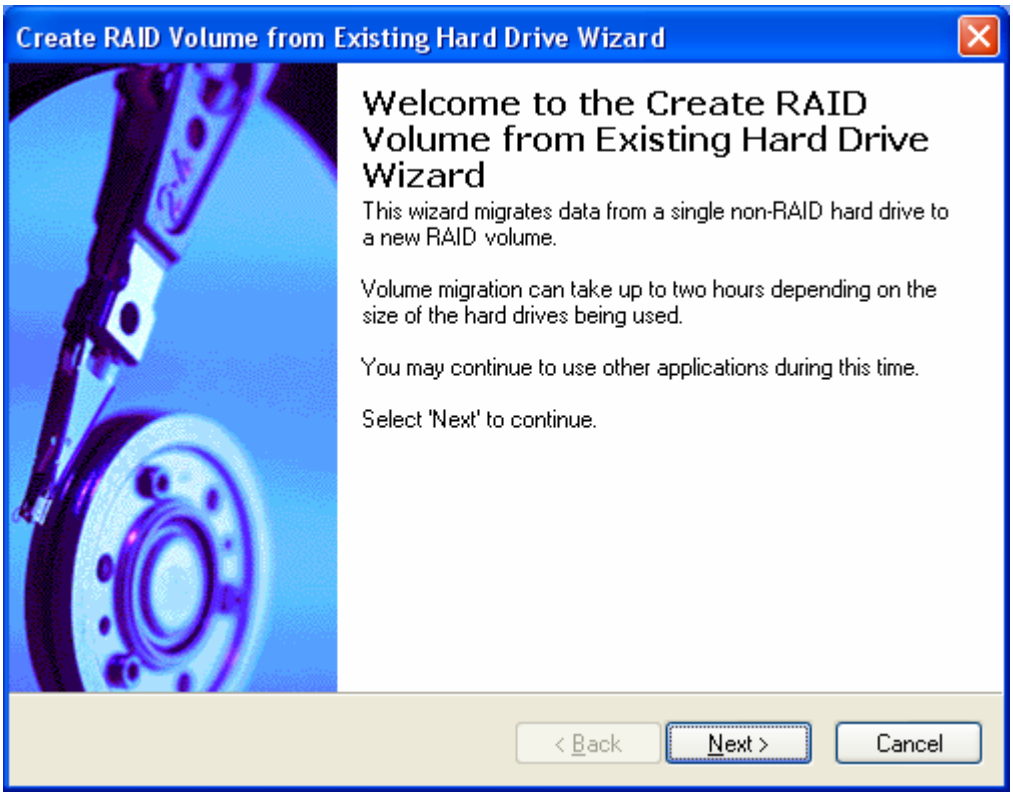
Note: The user interface should look similar to the following example:



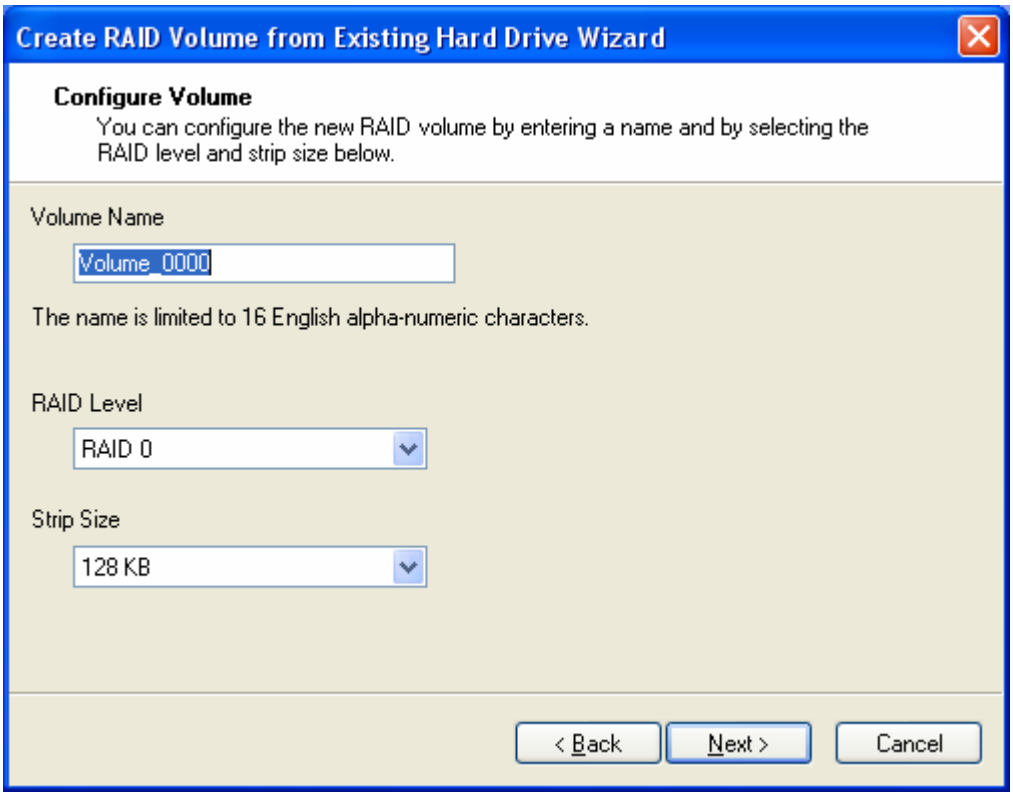
5. Perform a 'Create RAID Volume from Existing Hard Drive' migration (right-mouse click on 'RAID Volumes' entry in the device tree or select option under 'Actions' file menu). The menu option is shown in the following image:



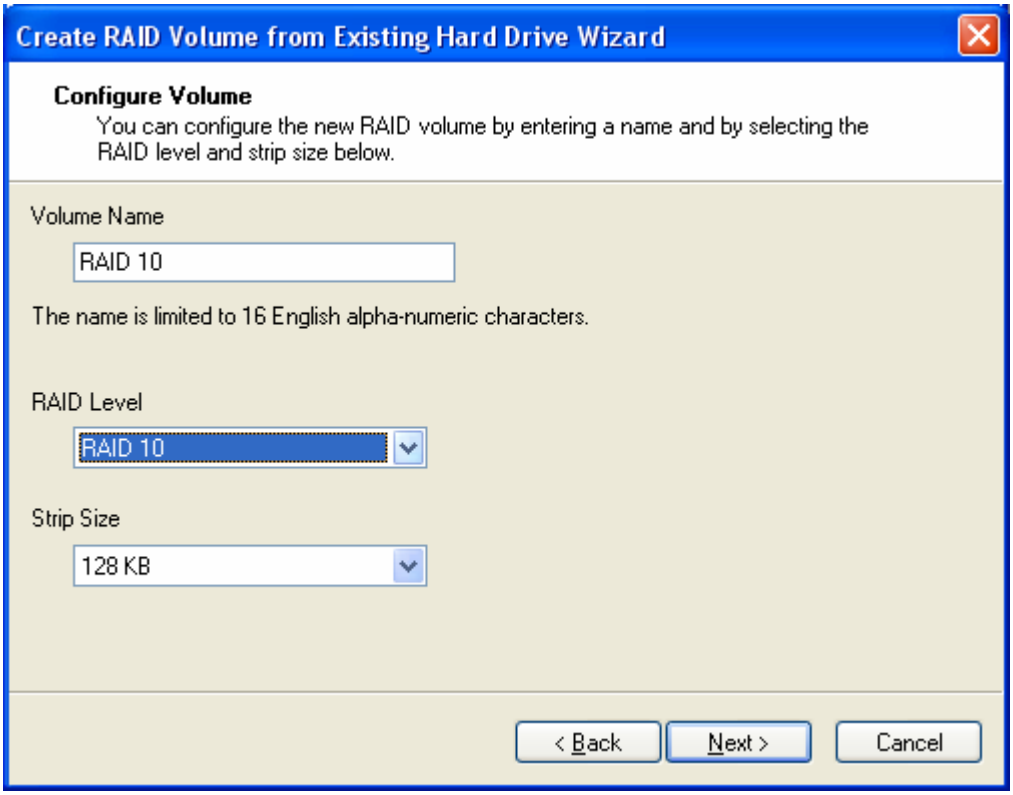
6. Click on the 'Next' button after the following welcome screen appears:


Create RAID Volume from Existing Hard Drive Wizard
Welcome to the Create RAID Volume from Existing Hard Drive Wizard
This wizard migrates data from a single non-RAID hard drive to a new RAID volume.
Volume migration can take up to two hours depending on the size of the hard drives being used.
You may continue to use other applications during this time.
Select 'Next' to continue.
< Back
Next >
Cancel

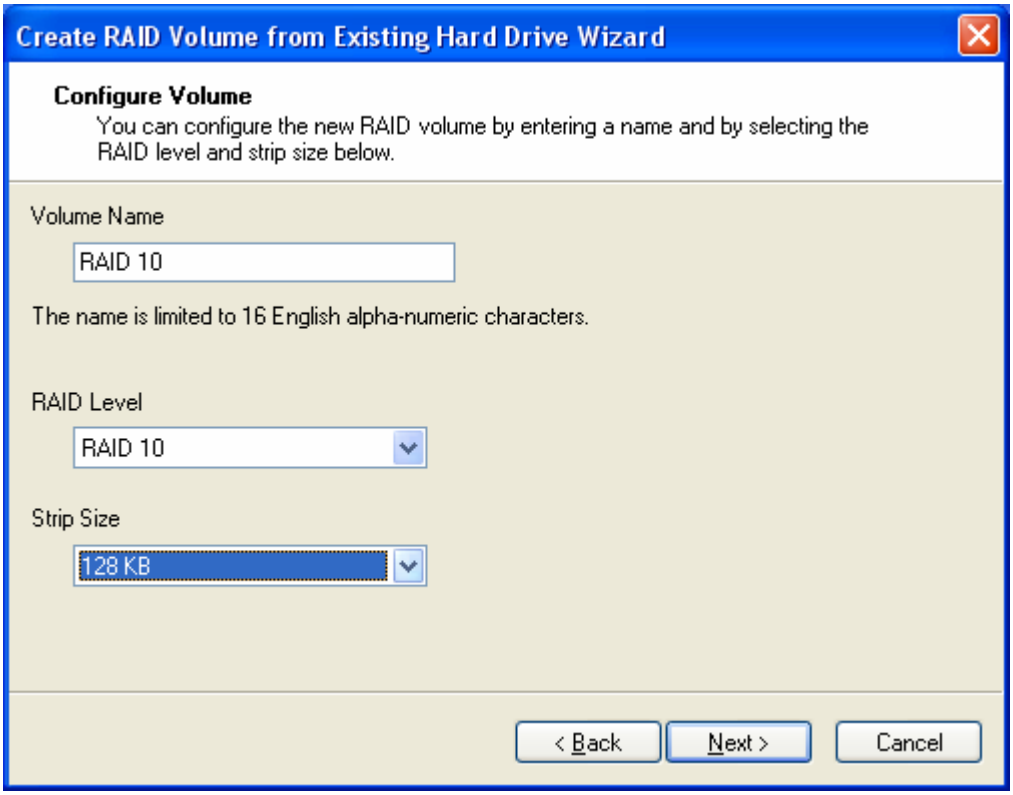
7. A desired RAID volume name should be typed in where the 'Volume_0000' text currently appears below. The RAID volume name must also be in English alphanumeric ASCII characters and has a maximum limit of 16 characters.


Create RAID Volume from Existing Hard Drive Wizard
Configure Volume
You can configure the new RAID volume by entering a name and by selecting the RAID level and strip size below.
Volume Name
Volume_0000
The name is limited to 16 English alpha-numeric characters.
RAID Level
RAID 0
Strip Size
128 KB
< Back
Next >
Cancel

8. Select a RAID level. If there are not enough hard drives in the system to create the selected RAID level, an error dialog will appear when the 'Next' button is selected and a new RAID level will need to be selected (or additional hard drives will need to be added to the system). In the following example, RAID 10 was selected.


Create RAID Volume from Existing Hard Drive Wizard
Configure Volume
You can configure the new RAID volume by entering a name and by selecting the RAID level and strip size below.
Volume Name
RAID 10
The name is limited to 16 English alpha-numeric characters.
RAID Level
RAID 10
Strip Size
128 KB
< Back
Next >
Cancel

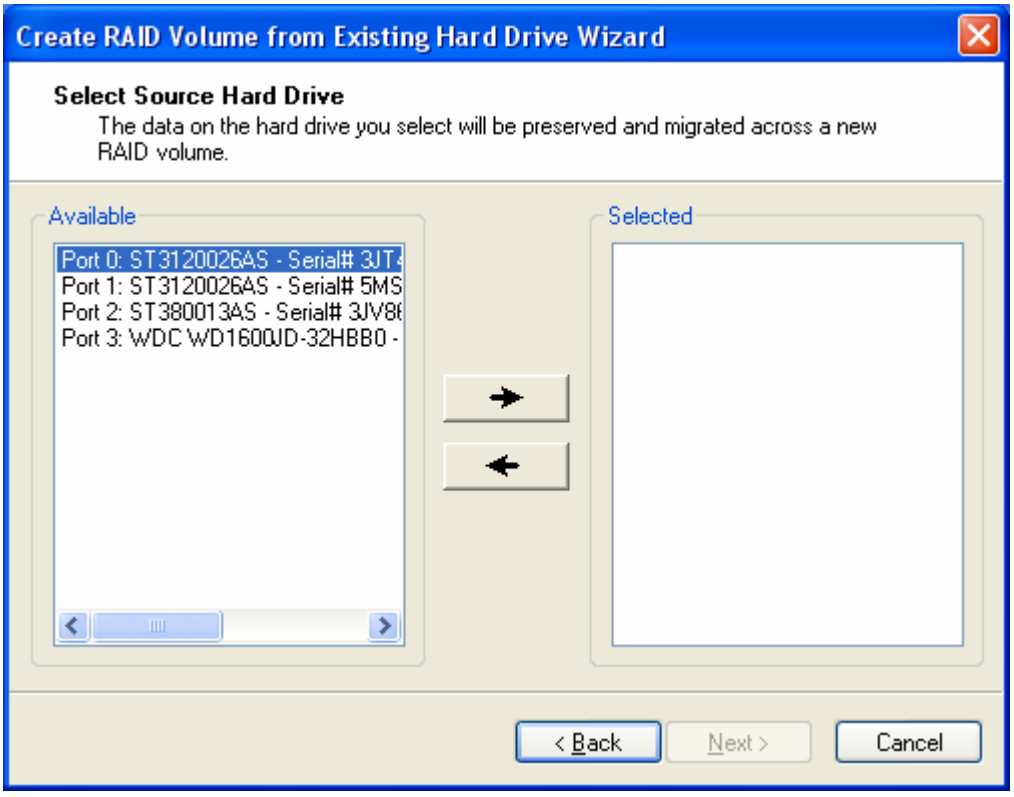
9. Select the desired strip size setting. As indicated, the default setting for RAID 10 is 128KB. The default setting for RAID 0 is also 128KB. The default setting for RAID 5 is 64KB. Even though the default setting is the recommended setting for most users, you should choose the strip size value that is best suited to your specific RAID usage model. Additional details on the most typical strip size settings are listed in Section 17.3.4 titled 'Strip Size Descriptions'.


Create RAID Volume from Existing Hard Drive Wizard
Configure Volume
You can configure the new RAID volume by entering a name and by selecting the RAID level and strip size below.
Volume Name
RAID 10
The name is limited to 16 English alpha-numeric characters.
RAID Level
RAID 10
Strip Size
128 KB
< Back
Next >
Cancel

10. Select 'Next' after choosing a strip size

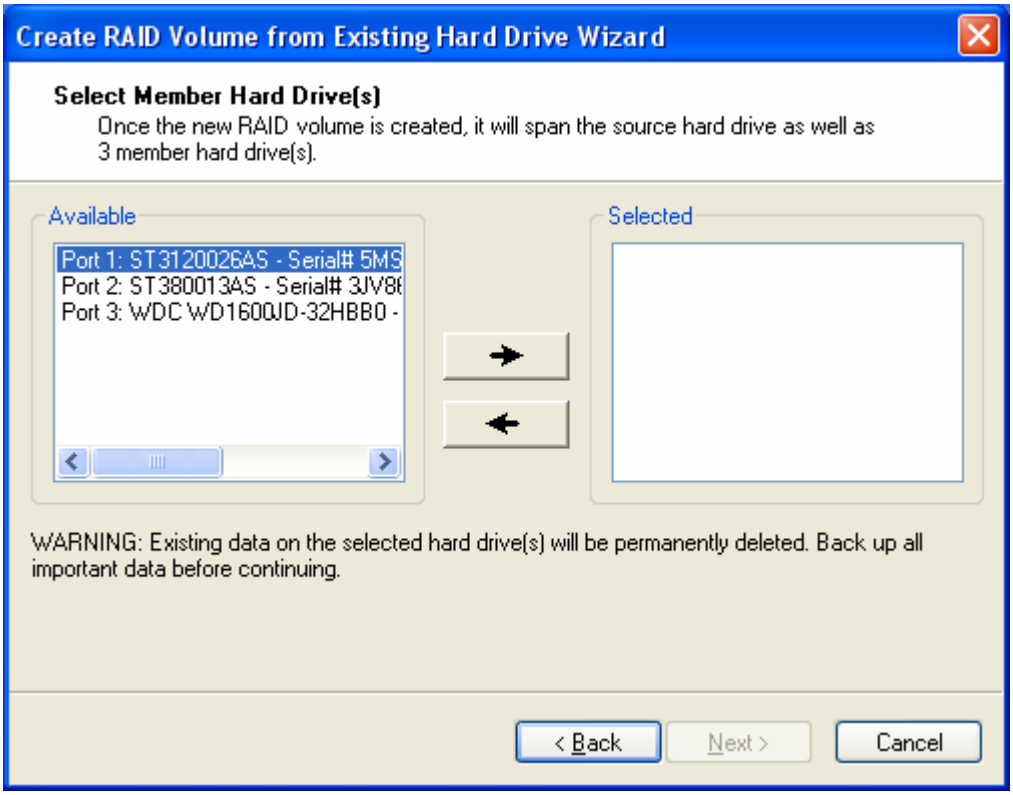
11. In the left-hand 'Available' window, select the source hard drive and then click 'Next'. The source hard drive can be selected either by double-clicking on the hard drive, or by single-clicking on the hard drive and then selecting the right arrow key. The data on the hard drive you select will be preserved and migrated across to a new RAID volume.

Warning: It is very important to note which disk is the source disk (the one containing all of the information to be migrated). On a RAID Ready system, this can be determined by making a note during POST of which port (e.g. Port 0 or Port 1) the single disk is attached to. You can also use the Intel Matrix Storage Manager before the additional disks are installed to verify the port and serial number of the drive that contains the data.

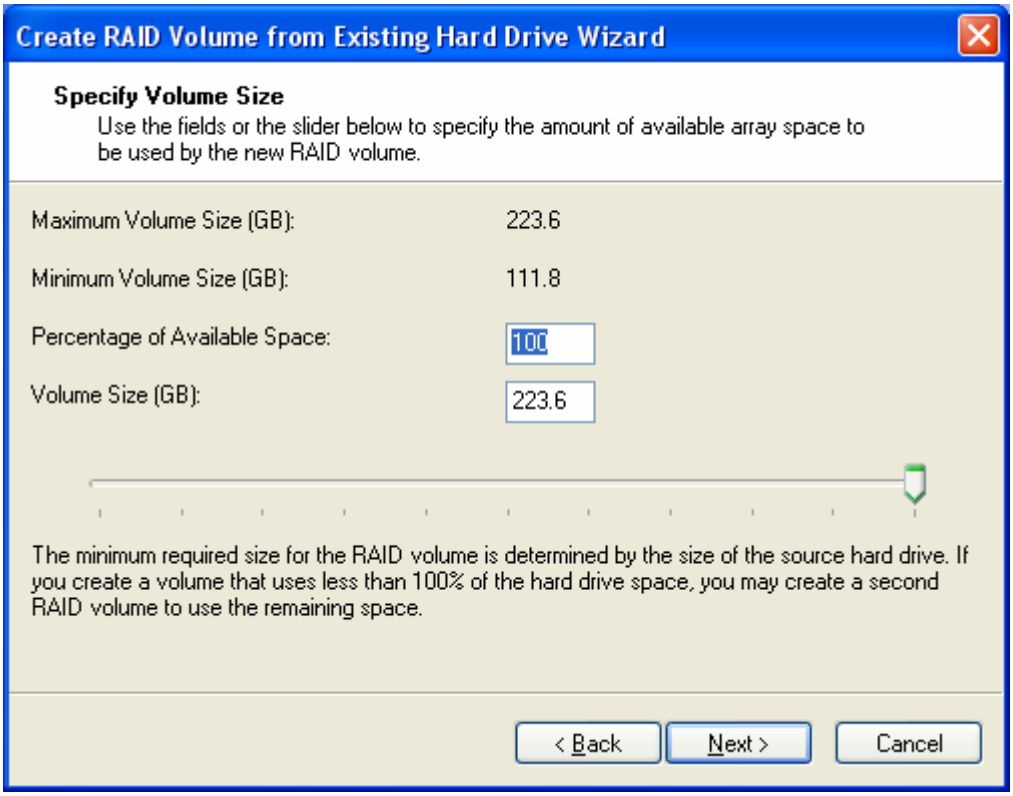

Create RAID Volume from Existing Hard Drive Wizard
Select Source Hard Drive
The data on the hard drive you select will be preserved and migrated across a new RAID volume.
Available
Port 0: ST3120026AS - Serial# 3JT
Port 1: ST3120026AS - Serial# 5MS
Port 2: ST380013AS - Serial# 3JV8
Port 3: WDC WD1600JD-32HBB0 -
Selected
< Back
Next >
Cancel

12. Select the member hard drives from the hard drives listed in the left-hand 'Available' window and then click 'Next'. If fewer hard drives are selected than are required for the RAID level, an error dialog will appear when the 'Next' button is clicked. Once the new RAID volume is created, it will span the source hard drive as well as any member hard drive(s):

Warning: **CRITICAL WARNING**: Existing data on the selected hard drive(s) will be permanently deleted. Back up all important data before continuing.

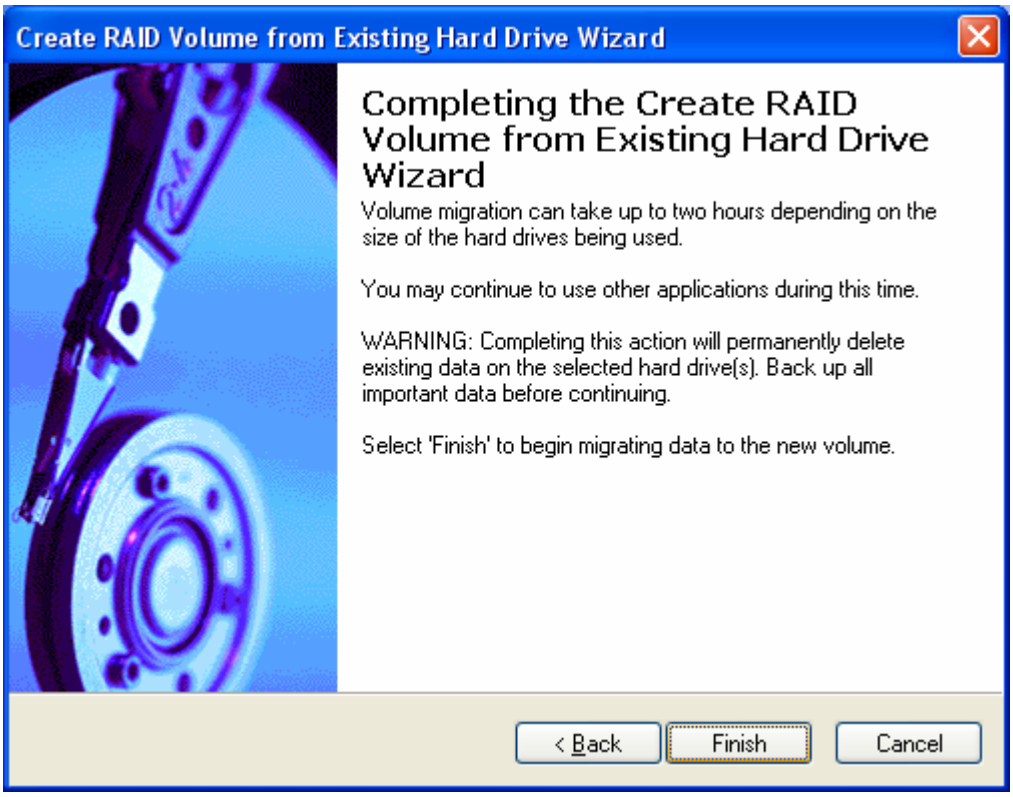

Create RAID Volume from Existing Hard Drive Wizard
Select Member Hard Drive(s)
Once the new RAID volume is created, it will span the source hard drive as well as 3 member hard drive(s).
Available
Port 1: ST3120026AS - Serial# 5MS
Port 2: ST380013AS - Serial# 3JV8
Port 3: WDC WD1600JD-32HBB0 -
Selected
WARNING: Existing data on the selected hard drive(s) will be permanently deleted. Back up all important data before continuing.
< Back
Next >
Cancel

13. Use the fields or the slider bar to specify the amount of available array space to be used by the new RAID volume and then click 'Next':


Create RAID Volume from Existing Hard Drive Wizard
Specify Volume Size
Use the fields or the slider below to specify the amount of available array space to be used by the new RAID volume.
Maximum Volume Size (GB):
223.6
Minimum Volume Size (GB):
111.8
Percentage of Available Space:
100
Volume Size (GB):
223.6
The minimum required size for the RAID volume is determined by the size of the source hard drive. If you create a volume that uses less than 100% of the hard drive space, you may create a second RAID volume to use the remaining space.
< Back
Next >
Cancel

Note: The migration process may take up to several hours to complete depending on the size of the disks being used and the strip size selected. While you can still continue using your computer during the migration process, after the migration process starts, it cannot be stopped. If the migration process gets interrupted and your system is rebooted for any reason, it will pick up the migration process where it left off.

14. Select 'Finish' to begin migrating data to the new volume:


Create RAID Volume from Existing Hard Drive Wizard
Completing the Create RAID Volume from Existing Hard Drive Wizard
Volume migration can take up to two hours depending on the size of the hard drives being used.
You may continue to use other applications during this time.
WARNING: Completing this action will permanently delete existing data on the selected hard drive(s). Back up all important data before continuing.
Select 'Finish' to begin migrating data to the new volume.
< Back
Finish
Cancel

15. After the migration is complete, reboot the system

16. Optional: Use 3rd party application or Windows* to create and format a new data partition on unused space, if any (see Note below)

Note: To ensure that non-Windows* partitions are kept intact, the migration to a RAID volume does not utilize the extra space made available by adding the additional hard drive(s). To take advantage of the extra hard drive space you will need to do one of the following:

- Create a new partition using Windows Disk Management (See Section 17.3.3 for instructions)

or

- Extend the partition to fill the rest of the available space. Windows does not natively include tools to do this, but there are 3rd party software utilities to accomplish this such as PartitionMagic* or Partition Commander*.

17.3.3 Creating a New Partition Using Windows* Disk Management

To create a new partition using Windows* Disk Management, complete the following steps:

1. Complete one of the following tasks, then proceed with the remaining steps:

a) Right-mouse click 'My Computer', select 'Manage'. In the Computer Management program window, left-mouse click 'Disk Management' in the program tree on the left (located under 'Storage' subsection).

or

b) Within the Control Panel (Start/Control Panel), double-click 'Administrative Tools'. In the window that appears, double-click 'Computer Management'. In the Computer Management program window, left-mouse click 'Disk Management' in the program tree on the left (located under 'Storage' subsection).

2. Maximize the Computer Management program window for easier viewing.

3. In the Computer Management program window, you should see your RAID volume represented as a physical disk. Notice that the RAID volume size is the size of the Serial ATA disks combined. At this point, you should see the partitions within the RAID volume that were originally on the single disk you used as your source. After the partitions, you should see a gray area labeled 'Free Space'. This area must be partitioned and formatted before it may be used.

17.3.4 Strip Size Descriptions

Strip Size Settings	Descriptions
4KB	For specialized usage models requiring 4KB strips
8KB	For specialized usage models requiring 8KB strips
16KB	Best for sequential transfers
32KB	Good for sequential transfers
64KB	Good general purpose strip size
128KB	Best performance for RAID 0 or RAID 10 for most desktops and workstations

18 Uninstalling the Intel Matrix Storage Manager

18.1 Uninstall Warning

Warning: **CRITICAL WARNING**: Removing the Intel Matrix Storage Manager from a system that has been configured as RAID will DELETE ALL EXISTING DATA from the RAID-controlled hard drive(s) and the data cannot be recovered. It is critical that you backup all important data before proceeding.

Uninstalling the Intel Matrix Storage Manager would render all data on any existing RAID volumes inaccessible and therefore it cannot be automatically uninstalled. It is recommended that any RAID volume be deleted before disabling the Intel 82801GR/GH SATA RAID Controller. Disabling the Intel 82801GR/GH SATA RAID Controller would re-enable the SATA controller and the operating system would no longer use the Intel Matrix Storage Manager driver.

For instructions on how to manually uninstall the Intel Matrix Storage Manager, please refer to Section 18.2 titled ‘Uninstallation on Windows* XP’.

18.2 Uninstallation on Windows* XP

To manually uninstall the Intel Matrix Storage Manager from your system, complete the following steps:

Note: **Important Note**: All the data on the RAID-controlled hard drive(s) will be DELETED and will not be accessible after completing these steps. Backup all important data before proceeding.

1. Reboot the system
2. Depending on your system configuration, complete one of the following set of tasks:

If the system has the Intel Matrix Storage Manager option ROM installed, follow the steps listed in section 13.4.3 titled ‘Reset Disks to Non-RAID‘

or

If the system does not have the Intel Matrix Storage Manager option ROM installed:

a. Enter the system BIOS Setup (usually done by pressing a key such as 'F2' or 'Delete' during boot-up)

b. Change the IDE configuration for the RAID-controlled hard drive(s) from 'RAID' to 'IDE'.

3. Delete any partitions on the hard drives that were previously connected to the RAID controller

4. Reinstall the operating system

Note: If you experience any difficulties making these changes to the system BIOS, please contact the motherboard manufacturer or your place of purchase for assistance.

19 Unattended Installation Under Windows* XP

To install the Intel Matrix Storage Manager as outlined in the Microsoft* document "Deployment Guide Automating Windows NT Setup," use the supplied TXTSETUP.OEM file included in the application package and insert the lines below into the UNATTEND.TXT file. This method is available for Windows* XP.

First, determine if your system contains a 32-bit or 64-bit processor. This can be done using the following steps:

1. On the Windows XP Start menu, select Control Panel.
2. Open the 'System' applet (you may first have to select 'Switch to Classic View').
3. Select the 'Hardware' tab.
4. Select the 'Device Manager' button.
5. The processor type will be indicated by the value under the 'Computer' section on the 'General' tab.
   - On a 64-bit system, Intel® Itanium or Intel® Itanium 2 or Intel® Pentium 4 will appear.
   - On a 32-bit system, a value other than Intel® Itanium or Intel® Itanium 2 will appear.

To install the Intel Matrix Storage Manager by unattended install, first extract the IAAHCI.CAT, IAACHI.INF, IASTOR.CAT, IASTOR.INF, IASTOR.SYS, and TXTSETUP.OEM files from the compressed .CAB file. To extract these files, run 'C:\IATA5X.EXE -A -A -P C:\<path>' as described in the ‘Advanced Installation Instructions’ section of the README.TXT. If the system has a 32-bit processor, the files will be located in the Drivers folder; if the system has a 64-bit processor, the files will be located in the Drivers64 folder.

Note: This same procedure can be used for systems using the 'Intel(R) 82801ER SATA RAID Controller,' the 'Intel(R) 6300ESB SATA RAID Controller,' the ‘Intel(R) 82801FR SATA RAID Controller,’ the ‘Intel(R) 82801FR SATA AHCI Controller’ or the ‘Intel(R) 82801FBM SATA AHCI Controller.’ Replace the text within the quotation marks.

Systems Configured for RAID Mode:

// Insert the lines below into the UNATTEND.TXT file

[MassStorageDrivers]

"Intel(R) 82801GR/GH SATA RAID Controller" = OEM

[OEMBootFiles]
iaStor.inf
iaStor.sys
iaStor.cat
Txtsetup.oem

Systems Configured for AHCI Mode:

// Insert the lines below into the UNATTEND.TXT file

[MassStorageDrivers]

"Intel(R) 82801GR/GH SATA AHCI Controller" = OEM

[OEMBootFiles]
iaAhci.inf
iaStor.sys
iaAhci.cat
Txtsetup.oem

Place iaAhci.cat, iaAhci.inf, iaStor.cat, iaStor.inf, iaStor.sys, and Txtsetup.oem in the following folder:

<SystemRoot>:\i386\OEM\Textmode

20 Intel® Matrix Storage Console

20.1 Description

The Intel® Matrix Storage Console is a Windows*-based application that provides management capabilities and detailed status information for storage devices and RAID arrays.

20.2 User Interface Modes

The Intel Matrix Storage Console provides device information using one of two views: Basic and Advanced.

Basic mode displays the status of the hard drives and an illustration of the current RAID volume. This mode is visual and uses animations to communicate the current status and any user actions. Basic mode is the default view of the user interface.

Advanced mode displays a combination of logical and physical views of the hard drives and any supported RAID volumes that may be present. The logical view provides details on the arrays and volumes in the RAID configuration. The physical view provides details on the hard drives and how they are connected to each other.

The user can switch between the Basic and Advanced modes by selecting the appropriate option in the View menu. If the user is in Basic mode, they can also click on the 'Switch to Advanced Mode view' button if it is present.

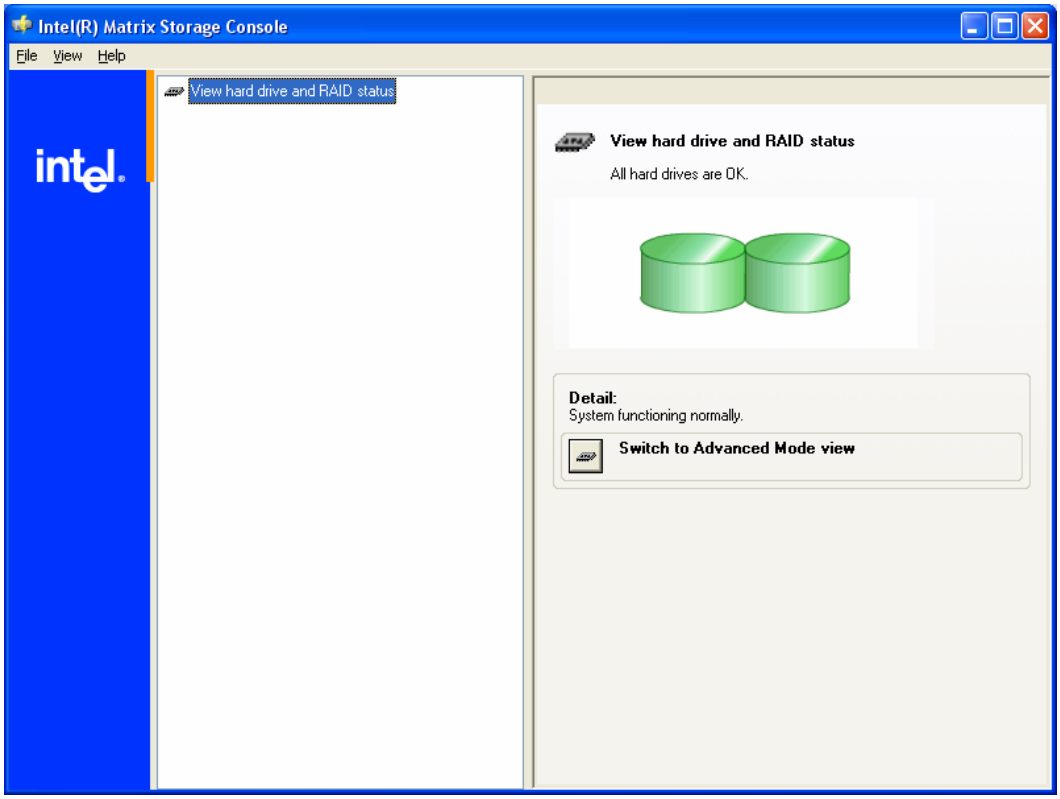
20.3 Create Volume Manually

The Intel Matrix Storage Manager offers the ability to create a RAID volume manually. This option should be used if you are using a third bootable device such as an IDE or SCSI hard drive – in addition to using two or more Serial ATA hard drives. One benefit of using a third bootable device and creating a RAID volume manually is that the operating system is not located on the RAID volume. Should something happen to the RAID volume, the operating system should not be impacted.

Note: The 'Create Volume Manually' option is not selectable unless a third bootable device (such as an IDE or SCSI hard drive) is installed in the system – in addition to using two or more Serial ATA hard drives.

To manually create a RAID volume, click on 'Actions' in the Intel Matrix Storage Console file menu and then select 'Create RAID Volume' as illustrated below:

Note: The 'Actions' menu will only be present in Advanced mode. If the 'Actions' menu is not present, switch to Advanced mode using the View menu, or click on the 'Switch to Advanced mode view' button if it is present. The following image provides an example:

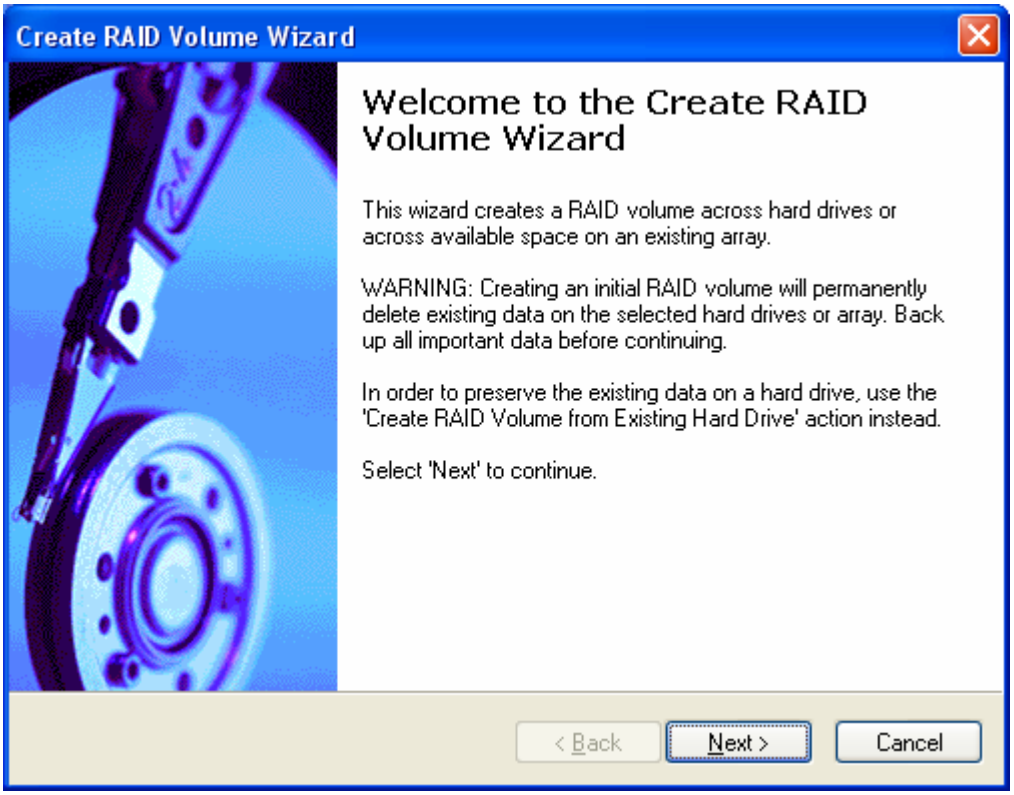

Intel(R) Matrix Storage Console
File View Help
View hard drive and RAID status
View hard drive and RAID status
All hard drives are OK.
Detail:
System functioning normally.
Switch to Advanced Mode view

20.3.1 Create RAID Volume Wizard

Click on the 'Next' button after the following welcome window appears:

Warning: **CRITICAL WARNING**: Creating an initial RAID volume will permanently delete existing data on the selected hard drives or array. Back up all important data before continuing. To preserve the existing data on a hard drive, use the 'Create RAID Volume from Existing Hard

Drive' action instead (refer to section 17 titled 'RAID Ready' for additional information).

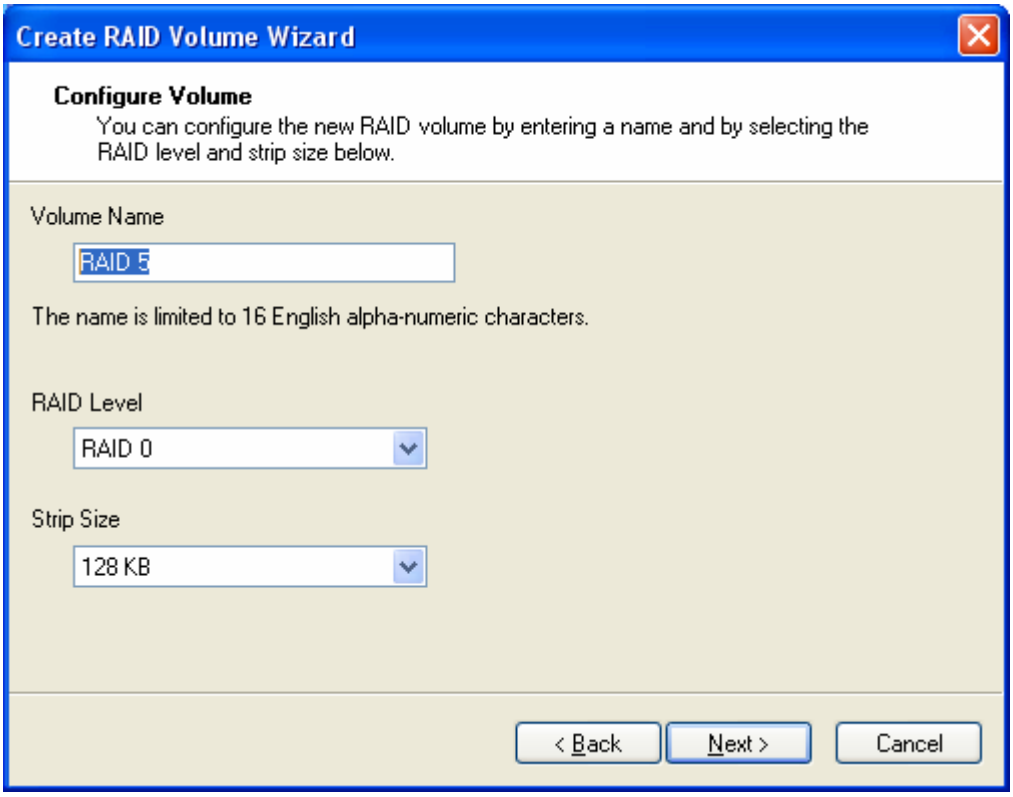

Create RAID Volume Wizard
Welcome to the Create RAID Volume Wizard
This wizard creates a RAID volume across hard drives or across available space on an existing array.
WARNING: Creating an initial RAID volume will permanently delete existing data on the selected hard drives or array. Back up all important data before continuing.
In order to preserve the existing data on a hard drive, use the 'Create RAID Volume from Existing Hard Drive' action instead.
Select 'Next' to continue.
< Back
Next >
Cancel

20.3.2 Configure Volume

Select the RAID volume name, RAID level, and strip size and then click 'Next':

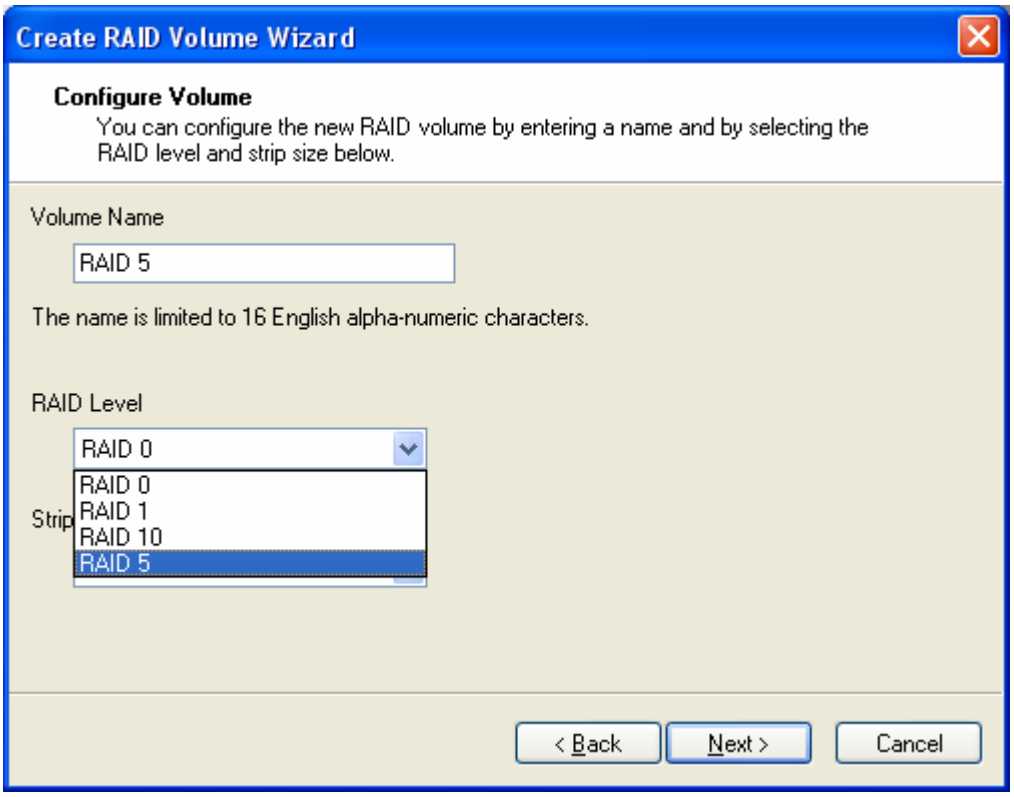
RAID Volume Name:

A desired RAID volume name needs to be typed in where the 'RAID 5' text currently appears above. The RAID volume name has a maximum limit of 16 characters. The RAID volume name must also be in English alphanumeric ASCII characters.


Create RAID Volume Wizard
Configure Volume
You can configure the new RAID volume by entering a name and by selecting the RAID level and strip size below.
Volume Name
RAID 5
The name is limited to 16 English alpha-numeric characters.
RAID Level
RAID 0
Strip Size
128 KB
< Back
Next >
Cancel

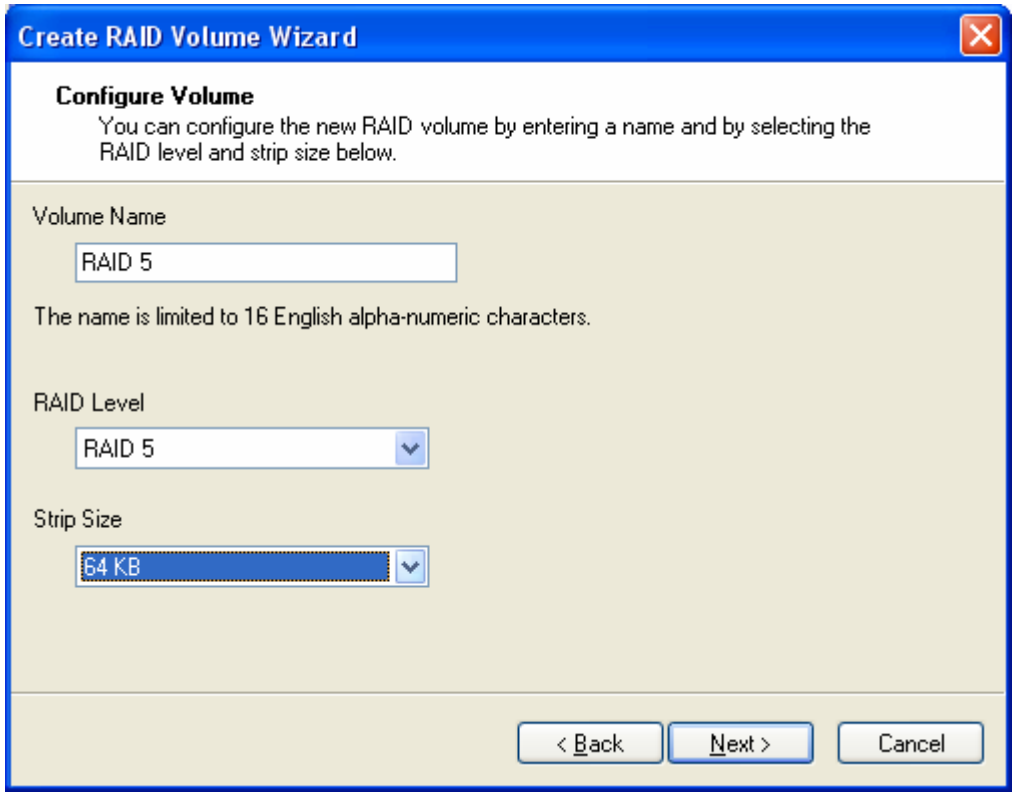
RAID Level:

Select the desired RAID level. In this example, RAID 5 was selected.



Strip Sizes:

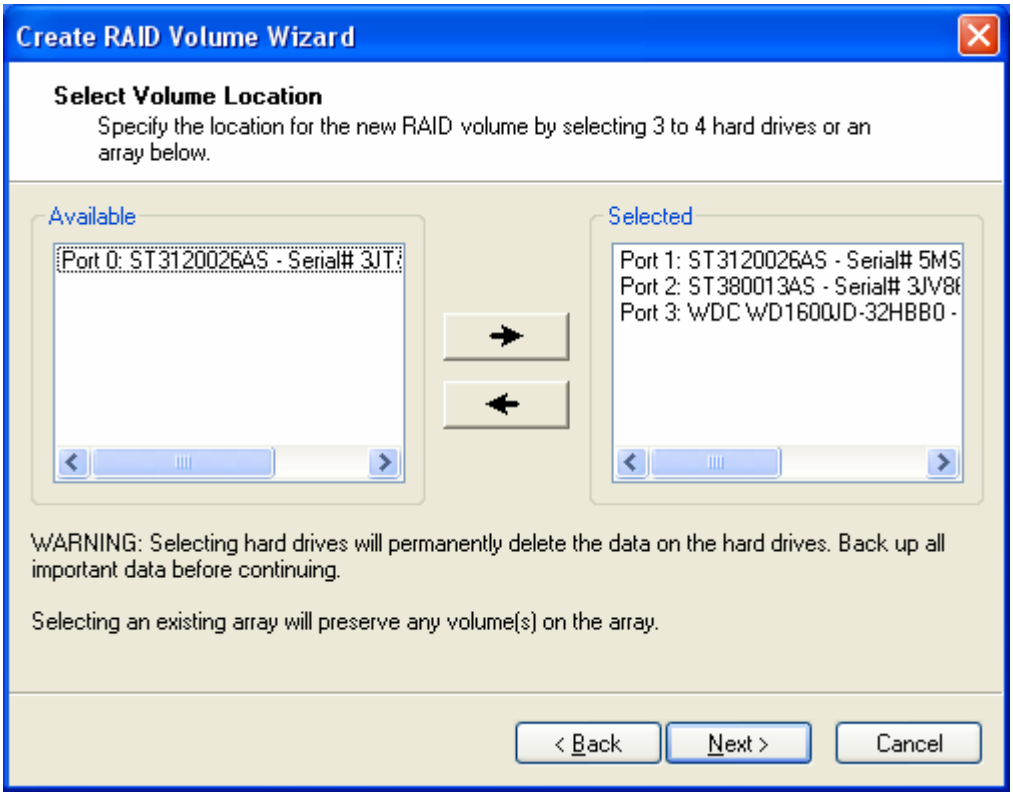
Select the desired strip size setting. As indicated, the default setting for RAID 5 is 64KB. The default setting for RAID 0 and RAID 10 is 128KB. Even though the default setting is the recommended setting for most users, you should choose the strip size value which is best suited to your specific RAID usage model. Additional details on the most typical strip size settings are listed in Section 17.3.4 titled ‘Strip Size Descriptions’.


Create RAID Volume Wizard
Configure Volume
You can configure the new RAID volume by entering a name and by selecting the RAID level and strip size below.
Volume Name
RAID 5
The name is limited to 16 English alpha-numeric characters.
RAID Level
RAID 5
Strip Size
64 KB
< Back
Next >
Cancel

20.3.3 Select Volume Location

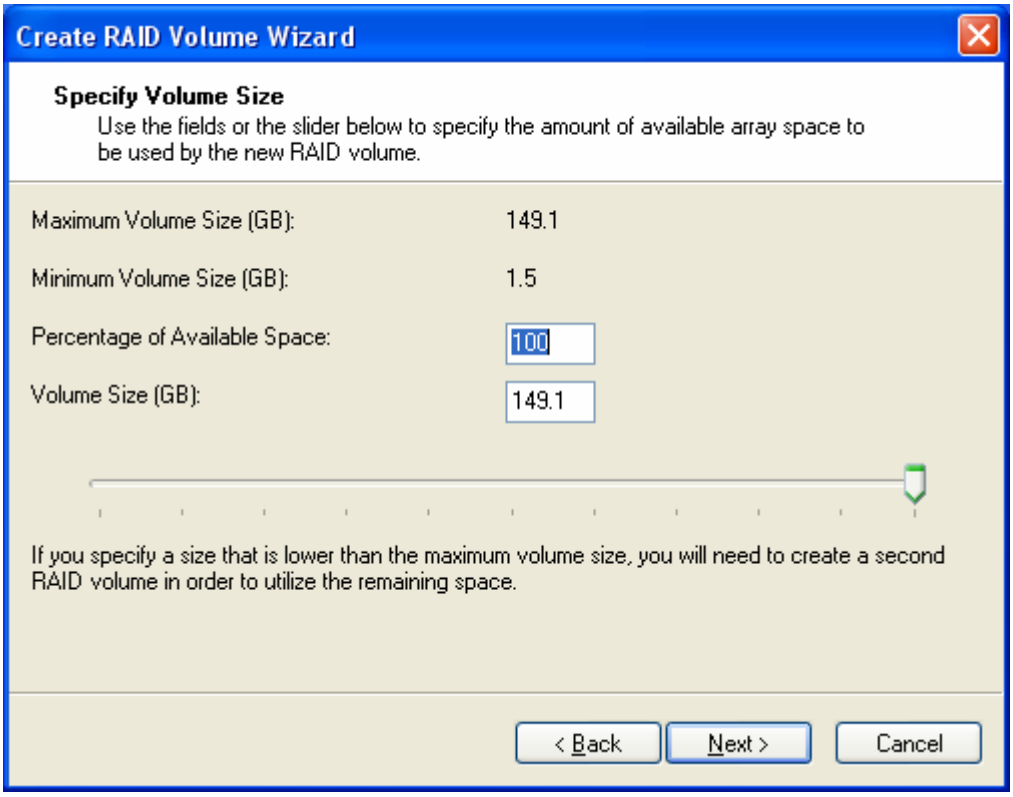
In the left-hand 'Available' window, specify the location for the new RAID volume by selecting 2, 3, or 4 hard drives or an array and then click 'Next':

Warning: **CRITICAL WARNING**: Selecting hard drives will permanently delete the data on the hard drives. Back up all important data before continuing. Selecting an existing array will preserve any volume(s) on the array.


Create RAID Volume Wizard
Select Volume Location
Specify the location for the new RAID volume by selecting 3 to 4 hard drives or an array below.
Available
Port 0: ST3120026AS - Serial# 3JT
Selected
Port 1: ST3120026AS - Serial# 5MS
Port 2: ST380013AS - Serial# 3JV8
Port 3: WDC WD1600JD-32HBB0 -
WARNING: Selecting hard drives will permanently delete the data on the hard drives. Back up all important data before continuing.
Selecting an existing array will preserve any volume(s) on the array.
< Back
Next >
Cancel

20.3.4 Specify Volume Size

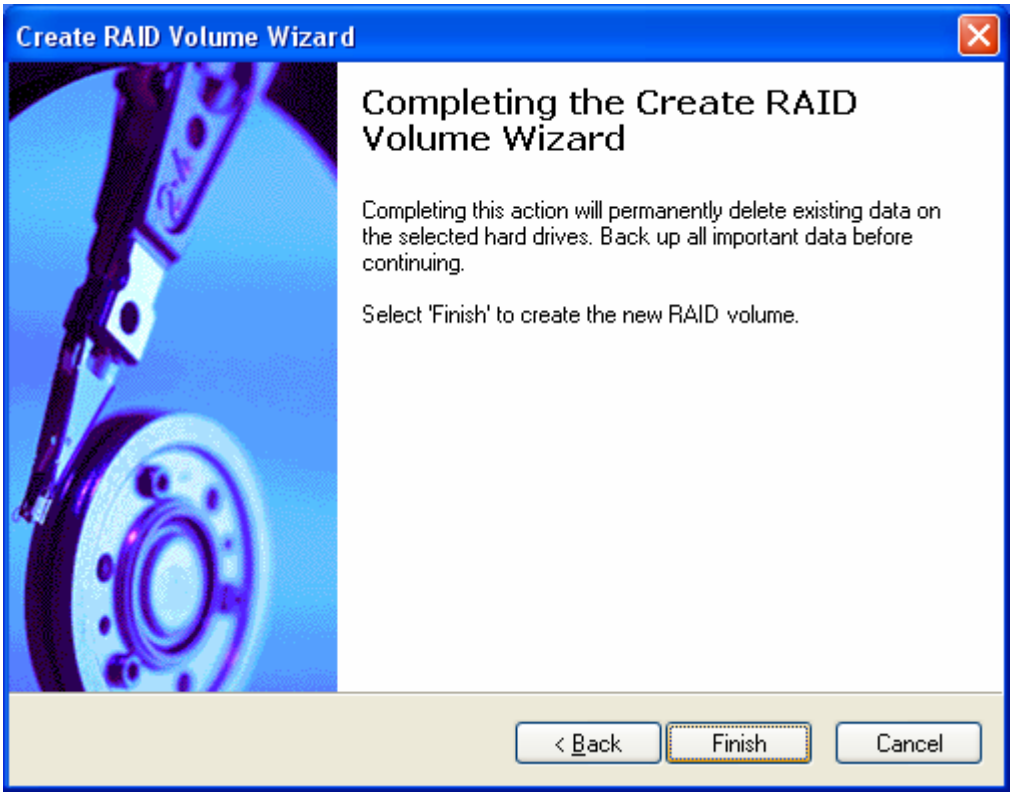
Use the fields or slider bar to specify the amount of available array space to be used by the new RAID volume and then click ‘Next’:


Create RAID Volume Wizard
Specify Volume Size
Use the fields or the slider below to specify the amount of available array space to be used by the new RAID volume.
Maximum Volume Size (GB):
149.1
Minimum Volume Size (GB):
1.5
Percentage of Available Space:
100
Volume Size (GB):
149.1
If you specify a size that is lower than the maximum volume size, you will need to create a second RAID volume in order to utilize the remaining space.
< Back
Next >
Cancel

20.4 Completing Create RAID Volume Wizard

Select 'Finish' to create the new RAID volume:

Warning: **CRITICAL WARNING**: Completing this action will permanently delete existing data on the selected hard drive(s). Back up all important data before continuing.


Create RAID Volume Wizard
Completing the Create RAID Volume Wizard
Completing this action will permanently delete existing data on the selected hard drives. Back up all important data before continuing.
Select 'Finish' to create the new RAID volume.
< Back
Finish
Cancel

20.5 Disk and Volume Status Parameter Descriptions

The Intel Matrix Storage Console displays a wide variety of information including the status of the physical disk parameters and the volume parameters. The status of the physical disk parameters indicates the health of the disk while the status of the volume parameters indicates the health of the RAID volume. Listed below are descriptions on the different disk and volume parameters that could appear:

20.5.1 Status Entries for Physical Disk Parameters:

Status	Indicates the health of the disk	
	Normal	Disk is present and functioning as expected
	Error Occurred	Disk has exceeded its unrecoverable threshold. Disk will continue to be accessed if it's a member of a RAID 0 volume.
	SMART Event	Disk has exceeded its recoverable error threshold and is at risk of failure.
	Missing	Disk is not present.
	Incompatible Version	Disk has RAID meta-data on it but its version is incompatible with the current version of RAID software. Updated version might be needed to resolve

20.5.2 Status Entries for Volume Parameters:

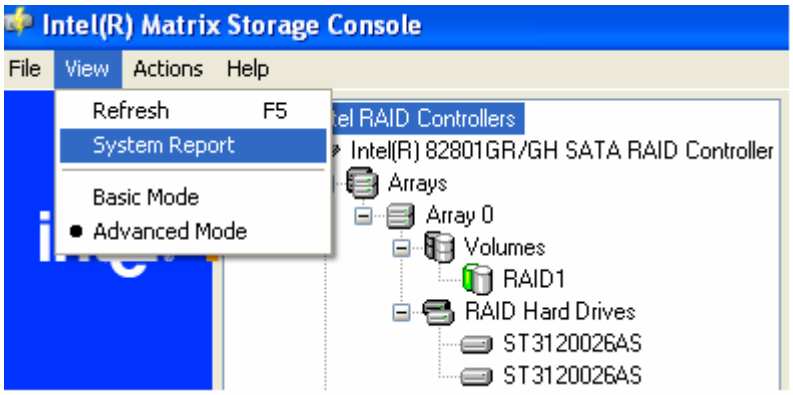
Status	Indicates the health of the RAID volume	
	Normal	Volume data is fully accessible to host
	Degraded	One disk in a redundant RAID volume is missing or has failed but the volume is still functional
	Failed	One or more disks are missing or have failed, and the volume will complete all I/O requests with a failing status.
	Migrating	A RAID volume topology (RAID level, strip size, capacity, etc.) is changing

20.6 Generate and View a Report using the Intel Matrix Storage Console

The Intel Matrix Storage Console allows you to generate and view a report. Everything that appears for each device in your system (except for the Serial #'s), can be generated into a report. This information can be very helpful if you need assistance from Intel Customer Support.

20.6.1 View System Report

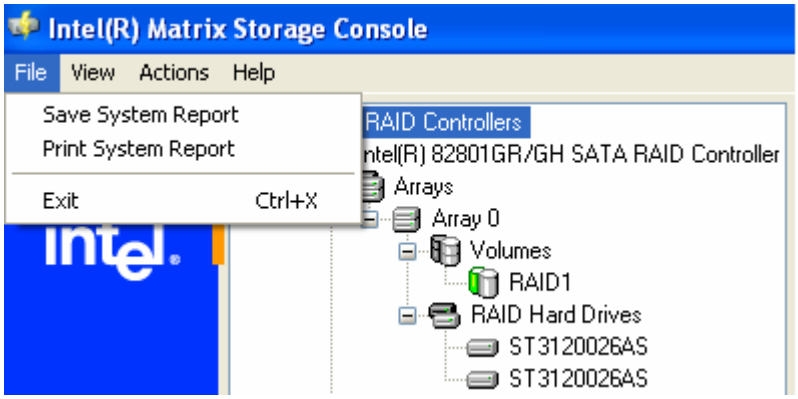
To generate and view a report, click on the 'View' menu (located at the top left of the window), then click on 'System Report' as illustrated in the following example:



When viewing the System Report, you will also have the ability to save or print the report.

20.6.2 Saving/Printing System Report

To save or print a report, click on the 'File' menu, then click on 'Save System Report' or 'Print System Report' as illustrated in the following example:



Selecting 'Save System Report' option:

The report can be saved to a location on your hard drive and then viewed with a text viewer such as Notepad* or WordPad*.

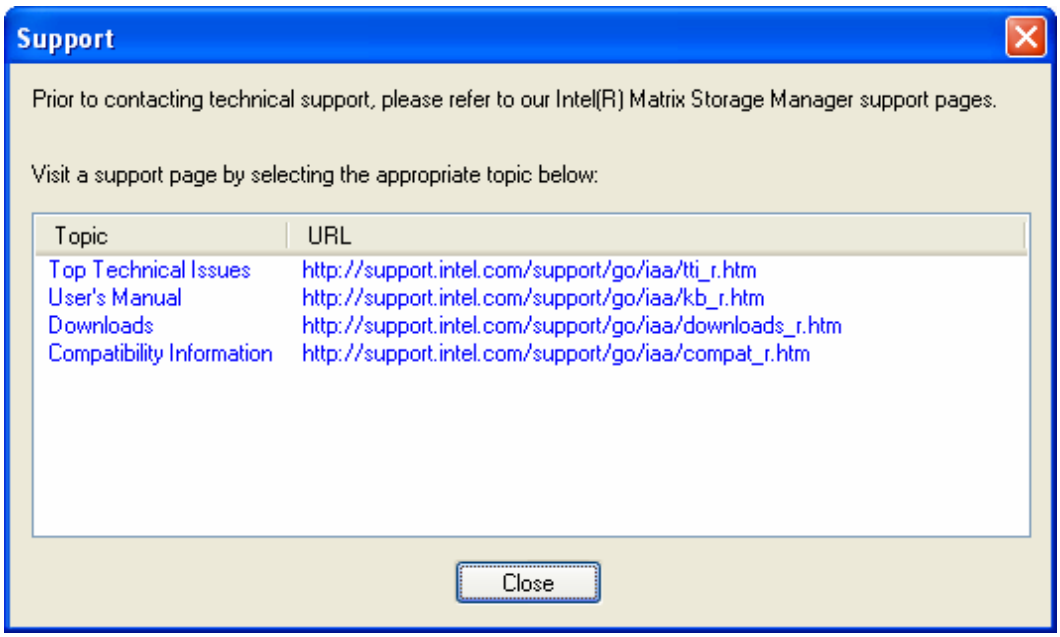
20.7 Support Tab Information

The 'Support' tab contains links to Intel Customer Support websites that provide information on any the following topics related to the Intel Matrix Storage Manager:

- Top Technical Issues
- User's Manual
- Intel Matrix Storage Manager Downloads

- Compatibility Information

The following illustration shows an example of the ‘Support’ tab:



21 Troubleshooting

Please refer to the following Intel Matrix Storage Manager website for troubleshooting information:

http://support.intel.com/support/chipsets/imsm/index.htm

21.1 RAID Volume Restoration

In the event that a RAID volume is reported as degraded or failed by the Intel Matrix Storage Manager tray icon, it may be possible to restore the RAID volume. If restoration is not possible, you will need to recreate the RAID volume and restore data manually from a back up. Refer to the section below that corresponds to your particular scenario to restore the RAID configuration on your system.

21.1.1 Failed RAID 0 Volume

A RAID 0 volume is reported as failed when one of its members fails or is disconnected. If either of these scenarios occurs, the RAID 0 volume and its data is no longer accessible. The RAID 0 volume can be recovered if a member is disconnected, but can not be recovered if a member has failed.

Missing Hard Drive Member

1. Make sure the system is powered off.
2. Reconnect the missing hard drive.
3. Power on the system. During the system startup, the Intel Matrix Storage Manager option ROM user interface will display the RAID 0 volume as 'Normal'.
4. After the operating system is running, select Intel Matrix Storage Console from the Start menu or click the Intel Matrix Storage Manager tray icon.
5. From the View menu, select 'Advanced Mode' to see a detailed view of device storage information.
6. Right click the RAID 0 volume in the device pane to confirm that it is operating normally. The status in the information pane will display as 'Normal'.

Failed Hard Drive Member

1. Make sure the system is powered off.
2. Replace the failed hard drive with a new one that is of equal or greater capacity.
3. Power on the system. During the system startup, the Intel Matrix Storage Manager option ROM user interface will display the RAID 0 volume status as 'Failed', prompting you to press Ctrl-I to enter the user interface.
4. Press Ctrl-I to enter the 'MAIN MENU'.
5. Select option 2 in the main menu to 'Delete RAID Volume'.
6. In the 'DELETE VOLUME MENU', select the failed RAID 0 volume, using the up and down arrow keys.
7. Press the 'Delete' key to delete the volume.
8. Press 'Y' to confirm the deletion.

9. Create a new RAID 0 volume. If the failed hard drive was a part of the system volume, you will also need to reinstall the operating system.

21.1.2 Degraded RAID 1 Volume

A RAID 1 volume is reported as degraded when one of its members fails or is disconnected, and data mirroring is lost. As a result, the system can only use the functional member. To re-establish data mirroring and restore data redundancy, refer to the procedures below.

Missing Hard Drive Member

1. Make sure the system is powered off.
2. Reconnect the missing hard drive.
3. Restart the system. The rebuild will occur automatically.

Failed Hard Drive Member

1. Make sure the system is powered off.
2. Replace the failed hard drive with a new one that is of equal or greater capacity.
3. Power on the system. During the system startup, the Intel(R) Matrix Storage Manager option ROM user Interface will display the RAID 1 volume status as 'Rebuild'.
4. After the operating system is running, select the Intel Matrix Storage Console from the Start Menu or click the Intel Matrix Storage Manager tray icon.
5. From the View menu, select 'Advanced Mode' to display a detailed view of the Intel Matrix Storage Console.
6. From the Volumes view in the device pane, select the RAID 1 volume. The status will display 'Rebuilding % complete'. After the rebuild is complete, the status will display 'Normal'.

21.1.3 Degraded RAID 1 and Failed RAID 0 Volume on a Single RAID Array

This can occur when two RAID volumes (0 and 1) exist on a single RAID array (see Matrix RAID). A RAID 0 volume is reported as failed and a RAID 1 volume is reported as degraded when one of their members fails or is disconnected.

Missing Hard Drive Member When the Operating System is on the RAID 0 Volume

1. Make sure the system is powered off.
2. Reconnect the missing hard drive.
3. Power on the system. During the system startup, the Intel Matrix Storage Manager option ROM user interface will display RAID 0 volume status as 'Normal' and the RAID 1 volume status as 'Rebuild'.
4. After the operating system is running, select the Intel Matrix Storage Console from the Start Menu or click the Intel Matrix Storage Manager tray icon.
5. From the View menu, select 'Advanced Mode' to display a detailed view of the Intel Matrix Storage Console.
6. From the Volumes view in the device pane, select the RAID 0 volume. The status of the RAID 0 volume will display as 'Normal' and the RAID 1 volume status will display as 'Rebuilding % complete' in the information pane when RAID 1 volume is selected.

7. After the RAID 1 volume rebuilding is complete, the status shows as ‘Normal’.

Missing Hard Drive Member When the Operating System is on the RAID 1 Volume or is on a Non-RAID Hard Drive

1. Make sure the system is powered off.
2. Reconnect the missing hard drive.
3. Power on the system. During the system startup, the Intel Matrix Storage Manager option ROM user interface will display RAID 0 volume status as ‘Normal’ and the RAID 1 volume status as ‘Rebuild’.
4. After the operating system is running, select the Intel Matrix Storage Console from the Start Menu or click the Intel Matrix Storage Manager tray icon.
5. From the View menu, select ‘Advanced Mode’ to display a detailed view of the Intel Matrix Storage Console.
6. From the Volumes view in the device pane, select the RAID 0 volume. The status will display as ‘Normal’ and RAID 1 volume status will display as ‘Rebuilding % complete’ in the information pane when the RAID 1 volume is selected.
7. After the RAID 1 volume rebuilding is complete, the status shows as ‘Normal’.

Failed Hard Drive Member When the Operating System is on the RAID 0 Volume

1. Make sure the system is powered off.
2. Replace the failed hard drive with a new one that is of equal or greater capacity.
3. Power on the system. During the system startup, the Intel(R) Matrix Storage option ROM splash screen will display the RAID 0 volume status as ‘Failed’ and the RAID 1 volume as ‘Degraded’.
4. Do not enter the Intel(R) Matrix Storage option ROM User Interface.
5. Install the operating system on the new non-RAID hard drive.
6. During the installation procedure, you will be prompted to Press F6 to load the RAID driver.
7. Press F6 to install the RAID driver onto the new non-RAID hard drive.
8. After installing the operating system and the RAID driver, open Windows Explorer to identify the new partition existing on the new hard drive and the partition existing on the degraded RAID 1 volume.
9. Copy the data you want to keep from the degraded RAID 1 volume onto the new partition.
10. If you intend to restore the RAID configuration with RAID 0 and RAID 1 volumes, continue with the following steps.
11. Select the Intel(R) Matrix Storage Console from Start Menu.
12. From the View menu, select ‘Advanced Mode’ to display a detailed view of the Intel Matrix Storage Console.
13. From the Volumes view in the device pane, select the RAID 0 volume and delete the volume by right clicking and selecting ‘Delete Volume’.
14. The ‘Delete RAID Volume’ Wizard will help to delete the volume.
15. Select the RAID 1 volume and delete the volume.
16. From the Actions menu, select ‘Create RAID Volume from Existing Hard Drive’ submenu to create a new RAID 0 volume.
17. The ‘Create RAID Volume from Existing Hard Drive’ Wizard will help to create the RAID 0 volume. Ensure the volume size is less than the Array size to create another volume.
18. Create a new RAID 1 volume.
19. You have restored your original configuration.
20. Move any of your original RAID 1 data back to this new RAID 1 volume if you wish.

Failed Hard Drive Member When the Operating System in on the RAID 1 Volume or on a Non-RAID Hard Drive

1. Make sure the system is powered off.
2. Replace the failed hard drive with a new one that is of equal or greater capacity.
3. Power on the system. During the system startup, the Intel(R) Matrix Storage option ROM user interface will display RAID 1 volume status as 'Degraded' and RAID 0 volume status as 'Failed'.
4. After the operating system is running, select Intel(R) Matrix Storage Console from the Start menu or click the Intel Matrix Storage Manager tray icon.
5. From the View menu, select 'Advanced Mode' to display a detailed view of the Intel(R) Matrix Storage Console.
6. From the Volumes view in the device pane, right-click the RAID 0 volume and select 'Delete Volume'. The 'Delete Volume Wizard' will guide through the deletion procedure.
7. To create a new volume, select 'Actions' menu and choose 'Create a new volume'. The 'Create RAID Volume Wizard' will guide through the creation procedure.
8. Use Windows Disk Management to partition and format the new RAID volume.
9. From the Volumes view in the device pane, select the RAID 1 volume and view the information pane. The status will indicate as 'Rebuilding: % complete'. After the rebuild is complete, the status shows as 'Normal'.

21.1.4 Degraded RAID 5 Volume

A RAID 5 volume is reported as "Degraded" when one of the members has failed or is disconnected. The volume will be reported as Failed when two or more members are missing or have failed. If this occurs, refer to the appropriate procedure below:

Missing Member

1. Make sure the system is powered off.
2. Reconnect the missing hard drive.
3. Power on the system. During the system startup, the Intel Matrix Storage option ROM user interface will display the RAID 5 volume status as 'Rebuild'.
4. After the operating system is running, select Intel Matrix Storage Console from the Start menu or click the Intel Matrix Storage Manager tray icon.
5. From the View menu, select 'Advanced Mode' to display a detailed view of the Intel Matrix Storage Console.
6. From the Volumes view in the device pane, select the RAID 5 volume and view the information pane. The status will indicate 'Rebuilding: % complete'. After the rebuild is complete, the status shows as 'Normal'.

Failed Member

1. Make sure the system is powered off.
2. Replace the failed hard drive with new hard drive that is of equal or greater capacity.
3. Power on the system. During the system startup, the Intel Matrix Storage option ROM user interface will display RAID 5 volume status as 'Rebuild'.
4. After the operating system is running, select Intel Matrix Storage Console from the Start menu or click the Intel Matrix Storage Manager tray icon.
5. From the View menu, select 'Advanced Mode' to display a detailed view of the Intel Matrix Storage Console.

6. From the Volumes view in the device pane, select the RAID 5 volume and view the information pane. The status will indicate 'Rebuilding: % complete'. After the rebuild is complete, the status shows as 'Normal'.

21.1.5 Failed RAID 5 Volume

A RAID 5 volume is reported as 'Failed' when more than one member has failed. If this occurs, please follow the procedure shown below:

Failed Members

1. Make sure the system is powered off.
2. Replace the failed hard drives with new hard drives that are of equal or greater capacity.
3. Power on the system. During the system startup, the Intel Matrix Storage Manager option ROM user interface will display the RAID 5 volume status as 'Failed', prompting you to press Ctrl-I to enter the user interface.
4. Press Ctrl-I to enter the 'MAIN MENU'.
5. Select option 2 in the main menu to 'Delete RAID Volume'.
6. In the 'DELETE VOLUME MENU', select the failed RAID 5 volume, using the up and down arrow keys.
7. Press the 'Delete' key to delete the volume.
8. Press 'Y' to confirm the deletion.
9. Create a new RAID 5 volume.
10. You will also need to reinstall the operating system on the new volume.

21.1.6 Degraded RAID 10 Volume

A RAID 10 volume is reported as 'Degraded' when one of the members has failed or is disconnected. A RAID 10 volume is reported as 'Failed' when at least two of the members have failed or are disconnected. If this occurs, restore the volume by following the appropriate procedure below:

Missing Member

1. Make sure the system is powered off.
2. Reconnect the missing hard drive.
3. Power on the system. During the system startup, the Intel Matrix Storage option ROM user interface will display the RAID 10 volume status as 'Rebuild'.
4. After the operating system is running, select Intel Matrix Storage Console from the Start menu or click the Intel Matrix Storage Manager tray icon.
5. From the View menu, select 'Advanced Mode' to display a detailed view of the Intel Matrix Storage Console.
6. From the Volumes view in the device pane, select the volume and view the information pane. The status shows as '
7. Rebuilding: % complete'. After the rebuild is complete, the status shows as 'Normal'.

Failed Members

1. Make sure the system is powered off.
2. Replace the failed hard drive with new hard drive that is of equal or greater capacity.

3. Power on the system. During the system startup, the Intel Matrix Storage option ROM user interface will display the RAID 10 volume status as 'Rebuild'.
4. After the operating system is running, select Intel Matrix Storage Console from the Start menu or click the Intel Matrix Storage Manager tray icon.
5. From the View menu, select 'Advanced Mode' to display a detailed view of the Intel Matrix Storage Console.
6. From the Volumes view in the device pane, select the volume and view the information pane. The status shows as '
7. Rebuilding: % complete'. After the rebuild is complete, the status shows as 'Normal'.

21.1.7 Failed RAID 10 Volume

A RAID 10 volume is reported as 'Failed' when at least two members have failed. If this occurs, please follow the procedure shown below:

Failed Members

1. Make sure the system is powered off.
2. Replace the failed hard drives with new hard drives that are of equal or greater capacity.
3. Power on the system. During the system startup, the Intel Matrix Storage Manager option ROM user interface will display the RAID 10 volume status as 'Failed', prompting you to press Ctrl-I to enter the user interface.
4. Press Ctrl-I to enter the 'MAIN MENU'.
5. Select option 2 in the main menu to 'Delete RAID Volume'.
6. In the 'DELETE VOLUME MENU', select the failed RAID 10 volume, using the up and down arrow keys.
7. Press the 'Delete' key to delete the volume.
8. Press 'Y' to confirm the deletion.
9. Create a new RAID 10 volume.
10. You will also need to reinstall the operating system on the new volume.

21.2 Volume Modification Failed Error Dialog

To migrate a 2 or 3-drive RAID 0 array or a 2-drive RAID 1 array to RAID 5, the hard drive(s) added to the system must be equal to or greater in size than the hard drive members of the RAID 0 or RAID 1 array.

If you receive the following dialog after clicking 'Finish' in the Modify Volume wizard, check the size of the hard drive(s) that were added to the system:

21.3 Larger Source Hard Drive Error

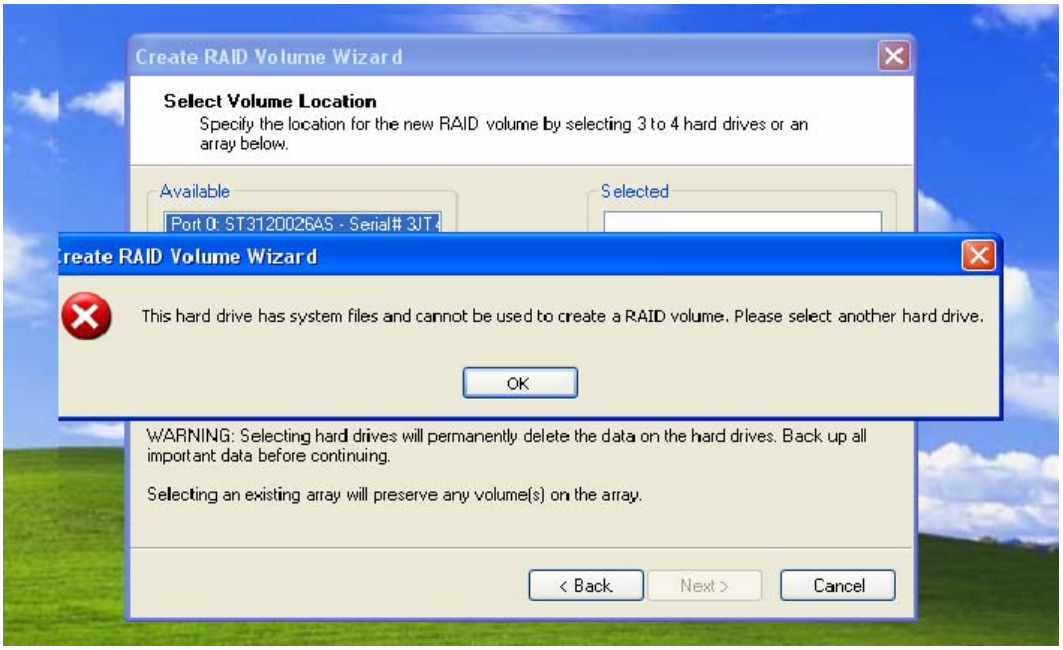
To migrate from a RAID Ready configuration to a RAID configuration, the member hard drives must be equal to or greater in size than the source hard drive. If the source hard drive is larger, the following error dialog will appear and the migration process will not begin:

Create RAID Volume from Existing Hard Drive Wizard
The source hard drive cannot be larger than the selected hard drive member(s).
Do one of the following to correct the problem:
- If already inserted, select larger hard drive member(s).
- Insert larger hard drive(s) into the system, and re-launch the Create RAID Volume from Existing Hard Drive Wizard.
OK

If the above dialog appears, follow the steps listed in the dialog to correct the problem.

21.4 Hard Drive has System Files Error

If the computer boots from a Serial ATA hard drive, that hard drive cannot be selected as a member hard drive during the manual ‘Create RAID Volume’ process. If it is chosen, the following error dialog will appear and the hard drive must be unselected and a new hard drive(s) chosen.


Create RAID Volume Wizard
Select Volume Location
Specify the location for the new RAID volume by selecting 3 to 4 hard drives or an array below.
Available
Selected
Create RAID Volume Wizard
This hard drive has system files and cannot be used to create a RAID volume. Please select another hard drive.
OK
WARNING: Selecting hard drives will permanently delete the data on the hard drives. Back up all important data before continuing.
Selecting an existing array will preserve any volume(s) on the array.
< Back
Next >
Cancel

22 Frequently Asked Questions (FAQs)

Please refer to the following Intel Matrix Storage Manager website for Frequently Asked Questions (FAQs):

http://support.intel.com/support/chipsets/imsm/index.htm

Appendix A How to Identify the Intel Chipset

If you are unsure which Intel chipset is located in your computer, first check the documentation that came with the computer for this information. If this is not successful, the Intel® Chipset Identification Utility provides an easy way to identify the specific Intel chipset that is located on your motherboard. The Intel Chipset Identification Utility can be downloaded from the following Intel website:

http://support.intel.com/support/chipsets/inf/chipsetid.htm

If Windows* has properly identified your Intel chipset, you should be able to look at Device Manager in Windows to identify your Intel chipset:

http://support.intel.com/support/chipsets/deviceman.htm

Note: If the above options do not provide the necessary information, a qualified professional may be able to assist you in determining the chipset included in your system. A qualified professional should be able to properly identify the chipset while taking all necessary precautions to safeguard your system. (If you choose to take your system to a qualified professional, you will be responsible for all associated costs).

Note: **Important Note**
The section below is for qualified and trained professionals only. Please do not follow the instructions listed below unless you are a qualified and trained professional. Only qualified and trained professionals should open a computer system.

Note: Some system manufacturers may void your warranty if you open the case. Check with the manufacturer if you have any concerns about this before proceeding.

Note: **Important Note**: Please do not follow the instructions listed below or attempt to open a computer system unless you are a qualified and trained professional.

Qualified and trained professionals shall take all necessary precautions to avoid damage to all computer systems, such as but not limited to disconnecting the power before opening the case, using proper electrostatic discharge (ESD) precautions (including ground straps, gloves, ESD mats), having suitable facilities and proper tools and training.

Identifying the Intel chipset components located in your computer can usually be done by looking at the motherboard for the chipset markings. Chipsets are comprised of multiple components and the website listed below shows the combinations that make up the various Intel® 800 series of chipsets.

Note: Intel strongly recommends that you do not try removing any heat sink attached to your chipset (if present) to view the chipset markings.

Chipset Photo Examples (*see http://support.intel.com/support/chipsets/inf/identify.htm*)

Appendix B Intel Chipset Software Installation Utility for Intel Chipsets

B.1 Description

The Intel Chipset Software Installation Utility (formerly referred to as Intel INF Installation Utility) for Intel chipsets was developed for updating certain versions of Windows. This utility allows the operating system to correctly identify the Intel chipset components and properly configure the system. The Intel Chipset Software Installation Utility installs specific Windows INF files. The INF files inform the operating system about how to properly configure the chipset for specific functionality, such as AGP, USB, Core PCI, and ISA PnP services.

For more details about the specific INF files that are updated, please refer to the README.TXT file that is included with the Intel Chipset Software Installation Utility for Intel chipsets.

Note: It is important that your Intel chipset is properly configured prior to installing the Intel Matrix Storage Manager. If the Intel Chipset Software Installation Utility is needed, it should always be installed prior to installing the Intel Matrix Storage Manager.

F6 Installation Note: If you plan on installing the Intel Matrix Storage Manager using the F6 installation method (Section 14), you will not be able to install the Intel Chipset Software Installation Utility first.

B.2 Obtaining the Intel Chipset Software Installation Utility

The Intel Chipset Software Installation Utility for Intel chipsets can be downloaded from the following Intel web site:

http://downloadfinder2.intel.com/scripts-df/Product_Filter.asp?ProductID=816

B.3 Confirming Installation of the Intel Chipset Software Installation Utility

To confirm that the Intel Chipset Software Installation Utility in installed, please refer to the instructions listed on the following Intel website:

http://support.intel.com/support/chipsets/inf/confirm.htm

B.4 Troubleshooting

After installing the Intel Chipset Software Installation Utility for Intel chipsets, certain symptoms may be seen depending on the system configuration. Please refer to the following Intel Chipset Software Installation Utility website for troubleshooting information:

http://support.intel.com/support/chipsets/inf/

Appendix C Serial ATA

C.1 Description

Serial ATA (SATA) is defined as the primary inside-the-box storage connection only, with no outside-the-box implementation. It is a storage device-centric technology and does not support other peripherals, such as cameras, scanners, or printers.

The Serial ATA 1.0 specification outlines the following benefits:

- *Performance Headroom*: SATA provides higher performance than equivalent ATA with performance scaling from 150MB/sec at introduction and 300MB/sec in the second generation. It is ultimately forecasted to reach 600MB/sec during its anticipated 10-year roadmap.
- *Software Transparency with Legacy Parallel ATA*: This enables a relatively easy transition to the new technology.
- *Low Cost*: SATA is cost-competitive with equivalent Parallel ATA solutions, including hosts, devices, and cabling in volume quantities.

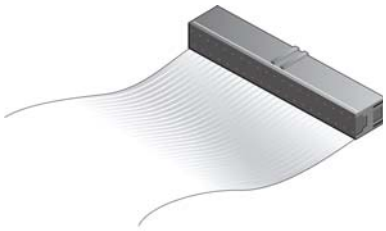
C.2 Comparing Serial ATA toParallel ATA

The table below compares Serial ATA (SATA) to Parallel ATA (IDE):

Serial ATA (SATA)	
Theoretical Transfer Rate (over life of SATA)	150/300/600 MB/sec (forecast only)
Transfer Mode	Generation 1-2
Data Cable	7-pin SATA
Max Data Cable Length	1 meter (39 inches)
Power Cable	SATA Power Cable
Power Consumed	250 mV

Parallel ATA (IDE)	
Theoretical Transfer Rate	133MB/sec
Transfer Modes	PIO – UDMA-6
Data Cable	40-pin, 80-conductor IDE
Max Data Cable Length	
Power Cable	IDE Power Cable
Power Consumed	5 V

The following illustrations show examples of SATA and IDE data cables:



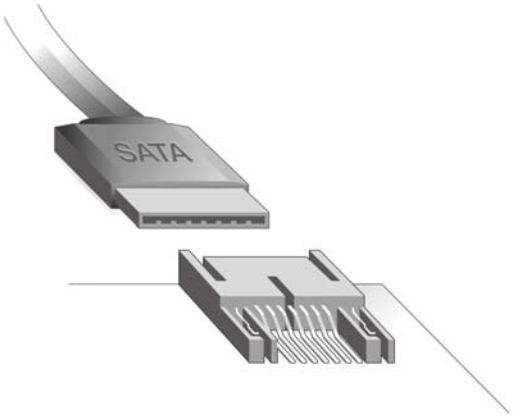
C.3 System Requirements

To use Serial ATA (SATA), your system must meet ALL of the following requirements:

- SATA compatible logic either on the motherboard or on a Serial ATA adapter card
    - Serial ATA adapter cards are not supported by the Intel Matrix Storage Manager
- SATA compatible BIOS
- SATA-aware device driver for the operating system
- SATA compatible device such as a hard drive
- A SATA data cable
- A SATA power cable

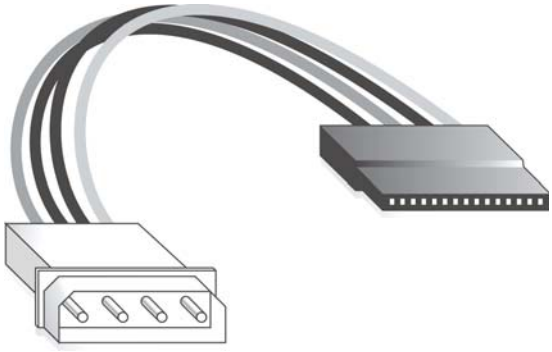
C.4 Serial ATA Data Cable

Serial ATA (SATA) data cables are 7-pin cables. Either end of the SATA data cable can be connected to the SATA hard drive or the connector on the motherboard. SATA data cables can be up to 1 meter (39 inches) in length. The following illustration shows an example of a SATA data cable:



C.5 Serial ATA Power Cable

Serial ATA power cables are usually 4 or 5-pin cables with 15-pin connectors. SATA power cables currently use an IDE/ATAPI to SATA power adaptor. One end of the SATA power cable is a typical 4-pin IDE/ATAPI power connector (which gets connected to an unused power cable from the power supply) and the other end (15-pin connector) gets connected to the SATA hard drive. The following illustration shows an example of a SATA power cable:



C.6 Are a Serial ATA Data and Power Cable Needed for Serial ATA?

To take advantage of Serial ATA (SATA), SATA data and power cables must be used. These SATA cables have a new design configuration; you cannot use older 40-pin, 80-conductor IDE or regular IDE power cables with SATA hard drives because they physically do not fit the SATA devices.

C.7 Mixing/Matching Serial ATA Hard Drives with IDE Hard Drives

If your motherboard has a supported Intel chipset and provides both IDE and Serial ATA connections, you can use both Serial ATA and IDE hard drives in the system. Note that Serial ATA hard drives use different data and power cables than IDE devices. To use both IDE and Serial ATA hard drives in a RAID configuration, please refer to Section 20.3 titled ‘Create Volume Manually’ for additional information.

C.8 Using IDE to Serial ATA Adaptors

Using IDE to Serial ATA adaptors (also referred to as “Serial ATA converter” or “device side dongle”) to connect IDE hard drives to Serial ATA ports is not recommended. Intel recommends that you only connect Serial ATA hard drives to Serial ATA ports. IDE to Serial ATA Adapters are not recommended for use with Intel Matrix Storage Technology because these devices have not been validated for use in Intel platforms. Intel does not provide support for configurations using IDE to Serial ATA Adapters.

C.9 Theoretical Transfer Rates Associated with Transfer Modes

The table below lists different transfer modes Serial ATA (SATA) devices support along with the theoretical transfer rate. Please refer to the documentation that was bundled with your device or contact the hardware manufacturer for more information about your specific device.

Note: This table contains theoretical transfer rates of SATA transfer modes supported by the Intel 82801ER I/O Controller Hub. Your actual transfer rates can vary from the information contained in this table. To take advantage of Serial ATA, your system must meet specific requirements. Please refer to Appendix C.3 for more information.

Table 1. Serial ATA Transfer Rates Associated With Transfer Modes

Mode	Theoretical Transfer Rate (MB/s)
Generation 1	150MB/s
Generation 2	300MB/s

Note: Refer to the Glossary (Appendix D) for a definition of the terms ‘theoretical transfer rate’, ‘sustained transfer rate’, and ‘burst transfer rate’.

Appendix D Glossary

48-bit LBA	Technology used with hard drives larger than 137GB
AHCI	Advanced Host Controller Interface (AHCI) is an interface specification that allows the storage driver to enable advanced Serial ATA features such as Native Command Queuing and hot plug.
Array Roaming	Ability to move a complete RAID array from one computer system to another computer system and preserve the RAID configuration information and data on that RAID array.
BIOS	Basic Input/Output System
Block size	Same term as 'Strip size': Grouping of data on a single physical disk within a RAID volume
Burst transfer rate	Maximum burst rate of the drive. These short transfers usually account for a small percentage of total transfer requests, mostly from the integrated controller cache or buffer.
Create From Existing Disk	Feature in the Intel Matrix Storage Manager which allows flexibility to upgrade from a single Serial ATA (SATA) hard drive to a RAID 0, RAID 1, RAID 5, or RAID 10 configuration when an additional SATA hard drive is added to the system. Occurs without loss of data.
Disks	Physical disks attached to a RAID controller
IDE	Integrated Drive Electronics
IDE to Serial ATA Adaptor	Also referred to as "Serial ATA converter" or "device side dongle." Connects IDE hard drive to Serial ATA port
ICH5R	Intel 82801ER I/O Controller Hub
ICH6R	Intel 82801FR I/O Controller Hub
ICH7R	Intel 82801GR I/O Controller Hub
Intel Matrix Storage Manager Option ROM	Standard PnP option ROM that provides a pre-operating system user interface for the Intel RAID implementation. Also allows boot order to be selected from within the BIOSes setup utility.
Matrix RAID	Combines the benefits of two RAID volumes on a single RAID array
Native Hot Plug	Feature supported by AHCI, allowing Serial ATA hard drive removal or insertion while the system is powered on and running. For example, this may be used when replacing a failed hard drive that is in an externally-accessible drive enclosure.
NCQ	Native Command Queuing (NCQ) is a feature supported by AHCI that allows for ATA drives to accept more than one command at a time. NCQ, when used in conjunction with a hard drive that supports NCQ, increases storage performance on random workloads by allowing the drive to internally optimize the order of commands.
Port0	Serial ATA port (connector) on a motherboard identified as Port0
Port1	Serial ATA port (connector) on a motherboard identified as Port1
Port2	Serial ATA port (connector) on a motherboard identified as Port2

Port3	Serial ATA port (connector) on a motherboard identified as Port3
POST	Power-On Self Test
RAID	Redundant Array of Independent Disks
RAID 0	Data striping array. RAID 0 stripes the data across all the drives but doesn't utilize parity. This RAID level is designed for speed and is the fastest of the RAID levels but provides the least protection.
RAID 1	Mirrored array. RAID 1 requires that each primary data disk have a mirrored disk. The contents of the primary disk and the mirror disk are identical. RAID 1 provides the best data protection but is slower than RAID level 0.
RAID 5	Striping with parity array. The data in the RAID volume and parity are striped across the array's members. Parity is written along with the data in a rotating sequence across the members of the array. This RAID level is a preferred configuration for efficiency, fault-tolerance, and performance.
RAID 10	RAID 0 + 1. Information is striped across a two disk array for system performance. Each of the drives in the array has a mirror for fault tolerance. RAID 10 provides the performance benefits of RAID 0 and the redundancy of RAID 1; however, it requires a minimum of four disk drives.
RAID Array	A group of physical disk drives managed by either hardware, software, or a combination of both
RAID Ready	Term used to describe a system that an end-user can turn into a RAID system by adding additional Serial ATA hard drive(s) and invoking the migration feature
RAID Volume	A block of capacity, allocated from a RAID array and arranged into a RAID topology. The operating system sees a RAID volume as a physical disk.
SCSI	Small Computer System Interface
Serial ATA (SATA)	New storage interface designed to replace parallel ATA (e.g. IDE technology). SATA was designed for a variety reasons, including performance headroom, cabling issues, and voltage tolerance requirements.
Strip	Grouping of data on a single physical disk within a RAID volume
Stripe	The sum of all strips in a horizontal axis across physical disks within a RAID volume
Sustained transfer rate	Rate at which the drive can transfer data sequentially from multiple tracks and cylinders on the disk (closer to real-world file transfers)
Theoretical transfer rate	Actual speed that the drive can read bits from the surface of the platter or write bits to the surface of the platter (can be used to compare drives against one another)